___ JOB NO: 5082 BASF ETT 113 6/96 6/17/96

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<u>FOI</u>	MARINE SERVICE CORP. FREEPORT, TEXAS REMAN'S DAILY TIME REPORT	dry.	0										T 0 T A
JOB NO DATE CLASS+	5082 6/14/96 ETT 113	driptblow		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1								***************************************	H O U R S
BADGE NO.	N A M E	6/14				i							
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	TOTAL HOURS	34,5								HER	00728	3 .	34.
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P. O. Drawer O . Freeport, Texas 77541

INVOICE NO.

3445

DATE

June 21, 1996

Job No.

5082

Location

Freeport, TX

TO:

BASE

607 Copper Rd. Freeport, TX 77541 PLEASE REMIT PAYMENTS TO:

11011 RICHMOND SUITE 500 HOUSTON, TX. 77042

Terms

: Net 30

FOR:

Service to the ETT 113 as follows:

Set up equipment

Strip out all free product

Blow cargo pipeline and stripping system

Vacuum blow dry cargo tanks

Sweep powder rust from cargo tank fluor

Pressure test cargo pipeline 40 PSI

Clean off deck

Remove equipment

Close Barge

Ballast wine tank 4 and bow rake

Nitrogen pad: pipeline and cargo tanks

LABOR:	Foreman	5.5 hr.	Œ.	38.00	209.00
		4 hr.	<u> </u>	53.25	213.00
	Journeyman	16.5 hr	@	32.50	536.25
		8.5 hr.	@	45.75	388.88
WATER:		61,700 gai	Œ	5.00/1,000 gal	308 .50
STOCK:	28.20	Plus 25%		7.05	35,25
EQUIPMENT:	Compressor	8	Ø.	48.00	384.00
-	Air Movers	20	666	5.00	100.00
	Vacuum	3	Œ.	30.00	90.00
	Haná Hose	3	œ	12.00	36.00
	 				

TOTAL AMOUNT DUE

\$2,252.88

PHONE: (409) 233-6371

Job Workscope/Breakdown

Job No: <u>508</u>	2 Customer: <u>BAS</u>	F Barge	: <u>ETT 113</u>
Foreman:	s/r <u>5.5</u>	@ 38.00 ,	209.00
	O/T	@ 53.25 '	213.00
Leadman:	S/T	@ 35.00	
	O/T	@ 49.50	
Journeyman:	s/T 16.5	@ 32.50	53 <i>6.25</i>
	ол8,5	@ 45.75	38 <i>8.</i> 88
Disposal:	Slop Oil	@ 0.60 '	
	Water	@ 0.35	·
Water:	61,700	@ 5.00/1,000 gal	308.50
Material:		Plus 25%	
Stock:	28.20	Plus 25% <u>7,05</u>	35.25
Equipment:	Compressor B	@ 48.00	384.00 384.00
10°	Air Movers 20	@ 5.00	100.00
	Forklift	@ 30.00	
	Tugboat	@ 100.00	 .
	Steam Rig	@ 100.00	
•	Vacuum 3	@ 30.00	90.00
	Hand Hose 3	@ 12.00	36.00
	Weld Machine	@ 15.00	·
	Cherry Picker	@ 70.00	
	Crane	@ 130.00	
	3" gas pump	@ 18.00	
	2" strip pump	@ 15.00	
	Butterworth	@ 10.00	
	4" elect. pump	@ 15.00	
	Cutting Rig	@ 8.00	
	Haul out	@1100.00	

Total Invoice:

2,156.88

Stock Use Breakdown

2 Coveralls	`@	2.85	5.70
2 Bancries	@	2.25	4.50
3 Respirator Filters	$\hat{\boldsymbol{g}}$	6.00	18.00
Gloves	Ø	1.75	
flashlights	<u>@</u>	12.00	
Gaskets	(ā)	6.00	· · · · · · · · · · · · · · · · · · ·
Goggles	ιĝ	2.95	
Boots	(ã)	9,00	
Jincoats	(<u>đ</u>	36.65	
i	Total		28.20
		Plus 25%	7.05
	Charge	Customer	35.25

DAMITTIME LOG

NAME HOURS TOTAL NAME HOURS TO HOURS TO HOURS	3:00 PM	<u> </u>		MICH CIME	4:00PM		
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Strength through environmental awareness and customer service

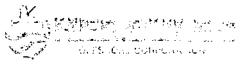
P.O. Drawer O Freeport, Texas 77541

6-14-86 JOB NO: 5082

Office (409) 233-6371 Fax. (409) 233-6375

QUI, PAUNT	HOURS USED	HOURLY	RATE	TOTAL PRICE
OMPRESSOR	5	44	.00	
UR MOVERS	20	5	.00	- ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
-CUM	3	20	.00	
LAK		80	.00	-
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TEERWORTH			.00	
STEEL PUMP			.00	
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TTING RIG			8.00	
## BARGE		3	5.00	
		110	0.00.	
		,		

BARCE NAME: E++2//3



FINAL CHECK MIST

6-14-96

W. VR: F++=113				
TOTAL NEW TRAINSTANCE 2	REPLACUS CASKET	YES_	NO	
THE VALUE NUMBER CHECKED 6	TELETYCED CYCKEG	YES_	NO:	
DOS MUNDIA CUPOKED /	סטבע מפטעבממת	YES_	NO	
CON VALVE BURGED COMORDO M/A	DEDY ACED CASKED	YES_	07/	_
DR FUFEL FLIND HUMBER CHROKED M/A	TESTVOSD CYCKER	YES_	00/	
TELLM DROK CANGO BIPELING RELIND TO			A%6	жо <u></u>
BRION DROK CARGO PIPELINE PLIND REM				
THE PANS VALLYES: CLOSED BY				
TIP PARS COVER: CLOSED BY				
STATEMENT AREA PLUG OR VALVES:	CLOSED BY DANIEL			
. : TEST CARCO LINE - 40psi - USING	SOAP			
MONATURE OF TESTER: Claude Out	Astr			
TENESS: Juen Quester				

CHECK VALVE GASKET WILL BE REPLACED

WIR TEST IS LAST TRING TO BE DONE REPORT RELEASING PARCE.

Salara Mariana, and a salara

DECLARATION OF INSPECTION PRIOR TO BULK CAUGO TRANSFER

	FIGUR 10 BU	LR CAGGO TRANSPI	±.	
VESSELS	BAS	£		
	E/tz	-1/3		
RANSFER FACILITY		las Free Dock		<u> </u>
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The following list refers a reverse). The spaces adjac an med.	to requirements set it cont to items on the it	forth in detail in 33 CFR 1 at are provided to indicate	56.150 and 46 Cr that the decails	N 35.35-30 (print of respuirement h
			DELIVERER	***CEIVER
1. Communication System	/Language Fluency (156.129) (m) (p))		
2. Wirning Signs and Ted	Warning Signals. (35.)	38-30)		1
3. Ventels Moorings. (156.)	120 (a))			
4 Transfar System Aligna				
6. Transfer System; unuse	si components, (156.12)	0 (a))		
d. Transfer Systems; fixed	piping. (158.120 (f))			
7. Gvarbuard Discharges/S		8.120 (g))		
8. Hoses or Loading Arms		- -		
0. Hoses; length and supp	ort. (158.120 (b) (c))			
to. Connections (156.130)		.*		
11. Discharge Containment	Systems. (156.126 (j) (f))		
II. Suppers of Division (14	(£120 (k))			
la. Kaieronicy Shudeni (U	50.120 (n)			
L. Repair Work Authorise	rion. (33.34-80)		N/A	N/A
io. Boller and Galley Pires	Salety. (35.25-30)		N/A	N/A
lik Fires or Open Flames (3v. 3 v-30)		N/A	N/A
17. Lighting (support to sum	rlao). (188.120 (t))			
18. Balu Smoking Spaces: (15.35-30)			
10. Spill and Brangancy sh	midown procedures, (i	56.120 (q))		
20. Surficient Personnel. (1	56.120 (o) (a))			
II. Transfer Conference. (I	\$6.120 (q))			
IX Agreement to begin tra	nader. (158.120 (r))			
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Marke Dust	101/200	FUEL PERSON	<u> </u>	

" Rules and Regulations for Tank Vessels.

HERCULES OFFSHORE CO.

COMPLETION DATE DEPARTURE DATE MIV DEPARTURE DATE MANE COMPLETION DATE DEPARTURE DATE DEPARTUR	CUBASE SILLING ADDRESS TO COPPER ROAD OF CITY AND SYAVE M Freeport, TX 77541 E PHONE HUMBER R 238-6161 WORK ADVINDATED BY LUNCTIC STOCK MATERIAL SYES INO IF YES, COMPLETE STOCK MATERIAL TRANSFER TICKET OUTSIDE SERVICES YES INO NITYMAN TYLK
AAUL OUT FOR INSPECTION AND REPAIR YES NO	
DATE:	
ITEM	NUMBERS
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DARGE CLEANING REPO	ort of the state o
JOB NO. 5082	ETA
BURCE NO. EXT. 113	DATESTAL BUILDING WELLET
CUSTOHER BASE	SAN TO STATE OF STATE OF THE TAX
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COMMITTEE CONTRACT TAKE	*
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MARCE HELEASED TO:	DATO/TIME:
DESPUTED GRENED: YES HANG CLOSED BY	EN CASKET YES - NO
BELING DECK CLARGO PIPELINE: BLEED OFFN YES NO	CLOSED BY NEW CADNET
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SLOP TANK STRIBBED: YER MA NO	
DRIP PANS STRIPPED: YES NO	
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	AKE: YES NO
VOIDS: YES NO SAFETY EQUIPMENT U	
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Annang transport of the state o	****************************
A NOTICE	•
All barges cleared for RADS will be inspected by Cale	ab Brett. The inspector will
have payablent for the browles forest in charge to two copies in the document wall box. One copy will :	stay in the mailbox, and the.
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inspection is completed and excurentation in in the the logistics representative must be contacted.	RELEADON. If my promises, west
Thomas / 1/1/1965 1937	12 45
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Inspected By M. Kom Dempson	, , , , , , , , , , , , , , , , , , ,
Inspected By Milha Daufsey	
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- Carlos Miller of Products - Carlos Section Mills (M. Cloven A Clove	HER 0073
	HER OUTS

	Inchcape	Testing	Ser	vices
#	Caleb Brett	_	\	

YOUR REFERENCE	
OUR REFERENCE	. <u> </u>

VISUAL TANK INSPECTION REPORT

ETT-113	PRODUCT/CARGO W/ 4			PORT/TERMINAL HEVCHIES				6-14-36			
Tank Number	1,2,3 :				<u> </u>		:				
Tank Coating	WA		May 1								
Last Cargo	cyclo	<u></u>									
Second Last Cargo	rydo						,				
Third Last Cargo	cyclo										
Time/Date Inspected	1240/6-14-				·						
Visual Cleanliness Accepted/Rejected*	o cented			•				,			
Reason for Rejection											

	TK#	Start blow range tonks stop liquid in tonk 30 mm. Dev feat
Method sald to	TK#	Pipeline - Stip for 45 win, Blow dry for 5 house
have been used	TK#	· · · · · · · · · · · · · · · · · · ·
to clean tanks:	TK#	
	TK#	· · · · · · · · · · · · · · · · · · ·
•	TK#	
	TK#	[18] 在京港灣學院的一個大學學學學學學學學學學學學學學學學學學學學學學學學學學學學學學學學學學學學

Information regarding previous cargoes, tank coating and cleaning method was obtained from vessel personnel and cannot be guaranteed as accurate by Caleb Brett U.S.A., Inc. and no liability can be assumed for errors resulting from improper information supplied. This report, of necessity, is based on such information.

The cleanliness of inspected tank(s) is/are based on visual inspection of tank surfaces and line system at accessible areas only. This document does not cover the cleanliness of tank surfaces and line system at inaccessible spots and/or possible release of components of previous cargoes during loading, discharge or transport of the cargo in question, for which the vessel is fully responsible. Suitability of tank coating for intended cargo must be guaranteed by vessel's owner or by suppliers of the coating.

The Section Comments

FOR CALEB BRETT

HER 00739

Form # 2-056-94

The second secon
The second second

Inchcape Testing Services Caleb Brett

YOUR REFERENCE	
OUR REFERENCE	

TIME LOG

VESSEL ETT-	113	Pf	W/A PORT/TERMINAL 100 - 100 - 14-96
	ł	1	
MONTH	DAY	HOUR	EVENT
6	14	1100	inspector Notified
		1230	inspector notified inspector arrived
		1230	commenced bage pre inspection
		1235	witnessed cago lines blown
		1240	completed barge pre: Inspection
		1245	final paperwork completed
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Page 1 of 2

printeds communication almosted OULL 1910.1200

EMBIDARA WILLIADODA MARRITTA ARVINING BROCKIN

Plant Hexcules

Superviso Claudo Para Cilant Safety_

The following Hered materials are considered to be haverdous to the employee. CACLOHEXANE

The employees assigned to work in this area have been informed of the hazardous materials in this area, the hazards they present to the workers, the location , of harards listed, the protective equipment that has been provided and where it is focused, and procedures to be fullowed in case of an accidental exposure. I have received theattaining listed above and will so designate algaing this form,

BALDOE NAME BABCE

CYCLOHEXANE, 98%

1

DANGERI

EXTREMELY FLAMMABLE · VAPORS MAY IGNITE EXPLOSIVELY. POSSIBLE ASPIRATION HAZARD.

DANGER: CONTAINS BENZENE · CANCER HAZARD. Benzene is a known human carcinogen · overexposure may create cancer risk, blood changes or chromosome changes. Benzene has caused letal death in animals.

PRECAUTIONS:

Keep away from heat, sparks and flame. Keep container closed. Use with adequate ventilation. Avoid contact with eyes, skin or clothing. Wash thoroughly after handling. Launder contaminated clothing before reuse. Do not swallow. May be aspirated into the lungs.

FIRST AID

In case of contact, flush eyes with water. Flush skin with water for 15 minutes. If inhaled, remove from exposure. If breathing is difficult, give oxygen, seek medical attention. If swallowed, do not induce vomiting. Seek immediate medical assistance. NOTE TO PHYSICIAN: Gastric lavage using a cuffed endotracheal tube may be performed at your discretion.

FOR ADDITIONAL INFORMATION, SEE MATERIAL SAFETY DATA SHEET.

MANUFACTURED BY
PHILLIPS 66 COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OK 74004
UNITED STATES OF AMERICA

FOAM 12500-8 12 80

HERCULES OFFSHORE CO.

DRDER No. 5082	CUSTOMER P.O.
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ON WAYS DATE:	
ITEM N	UMBERS
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4	
5	
6	
8	
9	
10	·
THIS SHALL SERVE AS YOUR AUTHORIZATION TO PROCEED W	VITH THE ABOVE. Date:

SHIPPING ORDER

DATE OR		Big	7 Thoree !	Merchant	Gases a	nd Equi	pment,	Inc.	1	PPERS OF	DER NO.			
WANTEN BY D Industrial Nitrogen Service						-			118-	INVOICE	<u> 3038</u> ATE			
DATE SH	K.Pe		neral Office: F	: P.O. BOX 3047 HOUSTON, TEXAS 77253 713/868-0333 ent to: P.O. BOX 200411 HOUSTON, TEXAS 77216-0411					ļ	INVOICE NO.				
L-14-96						S Customer 9181 Wills Tracking								
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TOTAL	CHARGEABLE MILES			of Units	:				20, 20 1 32 					
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Roundte	rip Miles From:				:.				·					
TOTAL	CHARGEABLE MILES		X No.	of Transports					· ·					
	ansport Time On Site				<u>-</u>				<u> </u>					
	nargeable Transport Timesknowledge that the above-into		rrect, and the Sen	rices have been com-	pleted, T	Three Carri	ntare: 17	2 F C			···-·			
	ized Signature	(CUL	fr d	Biç	Three Opera	ators: /	E.G.						
Title X	771	<u> </u>	Date	15-15-	a Re	marks:	 							
				# / J. *	-									
Big Thre	ee I.N.S. Representative	:						_	HER O	D744	,			

BIG THREE MERCHANT GASES AND EQUIPMENT, INC. GENERAL TERMS AND CONDITIONS OF SERVICE

The service consists of delivery of ritrogen or exygen to the Customer's use point (the "site") by means of connections famished by the Costomer, the quantities, pressorer and times of follows, being sall but to the Customer's directions. The Customer at all times has complete charge, custody, control and respondently for all tubing or other connections or equipment fornished for the receipt of delivery of the nitrogen or exygen for the Castoria, is an to the conditions within the unit production pipe or other equipment about or in the unit and the premises about the unit.

In consideration of the service and product prices as set out in its current price schedule, it is understood that the services and products of Big Three Industries, Inc., ("Big Three") is offered, furnished and sold only under the following terms and conditions:

- (1) A responsible representative of the Customer must be present at all times to designate and provide the point of connection into which nitrogen or oxygen is to be delivered and to designate the quantities of nitrogen or oxygen to be delivered, the pressures at which the same shall be delivered, and the times at which the same shall be delivered.
- (2) If, in order to gain access to on to return from the site, it is necessary to repair roads or bridges or to provide tractors, vessels of other special means of transportation for Big Three equipment, material or personnel, such shall be arranged and paid for by the Customer. The Customer shall be fully responsible for and shall indemnify Big Three against any loss arising as a result of any damage. to or loss of any of Big Three's equipment or materiels while same are being transported to or from the site by means furnished or arranged for by Customer or while such equipment or materials are being loaded upon or attached to any special means of transportation furnished or arranged for by Customer.
- (3) Purity of all product furnished under this Agreement shall comply with Compressed Gas Association standards. Big Three's only liability or obligation in respect to any product which falls to meet the standards provided for herein shall be to replace such product at Big Three's expense. BIG THREE MAKES NO WARRANTY OF ANY KIND, EXPRESSLY OR IMPLIED, EXCEPT THAT PRODUCTS DELIVERED HEREUNDER SHALL CONFORM TO COMPRESSED GAS ASSOCIATION STANDARDS UN-LESS OTHERWISE SPECIFIED. BIG THREE SHALL NOT BE LIABLE FOR DIRECT, INDIRECT OR CONSEQUENTIAL DAM-AGES-OF ANY KIND OR FOR DAMAGES ARISING FROM THE PRESENCE OR USE OF PRODUCTS HEREIN CONCERNED. WHETHER USED SINGLY OR IN COMBINATION WITH OTHER SUBSTANCES. THERE ARE NOT ANY WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HERE. Customer shall and does hereby indemnify and hold Big Three harmless against-any and all loss, cost, damage, liability, claim or expense, including (but not limited to) attorney's fee, arising out-ofinjury to or death of persons, or damage to or destruction of property singular property singular property in a security of persons or connected with, the sale of delivery of products concerned hereunder, or Customer's use thereof.
- (4) While Big Three will render the services contracted for to the best of its ability, it does not guarantee any results and, except in the case-of-gress or willful negligence on its part, shall not be liable or responsible for any-damage to the site or any-equipment-located at the site or for any loss or damage whatsoever (including injury to or death of person or property damage) growing out of or in any way connected with its operations and Customer shall absolve and hold Big Three Industries, Inc. harmless against all liability for any a such loss or damage sustained or incurred by Customer or any third party irrespective of the cause, as 60% 50%
- (5) All-statements rendered for services performed by Big Three-shall be paid a tis offices in Houston. Texas within thirty days. from date of statement. If not paid within thirty days, the unpaid amount of such bill shall bear, interest at the rate of ten per, cent, per it annum and, if necessary to be collected by an attorney, an additional amount shall become due and payable as reasonable attorney's ja kanana manda araba araba Date & Rine Completed

(6) This contract shall be construed in accordance with the laws of the State of Texas.

POTALNAUMITHOURS

(7) All of the preceding terms and conditions shall apply in favor of any manufacturer of supplier of any equipment Big Three may use in the performance of artiempted performance of any of its services.

(8) Prices listed in Big Three's current schedule do not include sales or similar taxes and it reserves the right to add such taxes, if so any, to its published prices. Any tax based on or measured by the charges made for, or the cash receipts from the sale of materials or

products or the rendering of services shall be added to the stated price.

Failure to enforce any or all of the above terms and conditions in a particular instance shall not constitute a waiver of or preclude. subsequent enforcement." "ALIONARGENSLE VELES

No employee is empowered to alter or waive any of above terms and conditions.

Oral Perseyou Thrie On Site

Prices are subject to change without notice.

BIG THREE MERCHANT GASES AND EQUIPMENT IN Houston, Texas

HAZARD COMMUNICATION **PACKET**

Industrial **N** itrogen S ervice

Special Oxygen S ervice



This envelope contains:

- ☐ Nitrogen MSDS ☐ Safety Checklist
- ☐ Oxygen MSDS
- ☐ Safety Precautions Pamphlet
- Other: _____

For additional safety information, contact INS/SOS at: AIR LIQUIDE AMERICA, PO Box 3047, Houston, TX 77253, or (713) 896-2265

AIR LIQUIDE AMERICA CORPORATION P. 0. BOX 3047 HOUSTON, TX 77253

PURCHASE ORDER E6269

MATERIAL SAFETY DATA SHEET

I-GENERAL INFORMATION

PRODUCT NAME NITROGEN

EMERGENCY TELEPHONE NO. 713-868-0302
MANUFACTURERS NAME AIR LIQUIDE AMERICA CORP.
TRADE NAME/SYNONYMS NITROGEN: NITROGEN NE
CHEMICAL NAME AND SYNONYMS
NITROGEN
NITROGEN
DEVILOR DESCRIPTION OF THE PROPERTY O

REVISION DATE: 08/24/89 CHEMICAL FAMILY INERT GAS

PRODUCT ID. UN 1066 FORMULA CAS FAMILY 7727-37-9

***** **** SECTION NOTES

MSDS INFORMATION NUMBER: (713) 896-2140

II-HAZARDOUS INGREDIENTS

HAZARDOUS MIXTURES OF LIQUIDS AND GASES

0/0 TLV

NITROGEN ** NONE ESTABLISHED 100 **

III-PHYSICAL OATA

BOILING POINT -320.4F (-195.9C) & 1 AIM
SPECIFIC GRAVITY (AIR = I): 0.967 & 70 F (21.1C) & 1 ATM
VAPOR PRESSURE N/A
PERCENT VOLATILE BY VOLUME (0/0) N/A (GAS)
DENSITY 0.07245 LB/CU FT
& 70 F (21.1 C) & 1 ATM
EVAPORATION RATE N/A (GAS)
SOLUBILITY IN MATER 2.33SCC/100CC H20 & 32 F (0 C)
MATERIAL AI NOPMAL CONDITION GAS
EXPANSION RATIO (LIQUID TO GAS) N/A (GAS)

APPEARANCE AND ODOR

COLORLESS, ODURLESS, TASTFLESS GAS

IV-FIRE AND EXPLOSION HAZARD

FLASH POINT (METHOD USED) FLAMMABILITY LIMITS IN AIR (U/O BY VOL) LOWER N/A

UPPER N/A

EXTINGUISHING MEDIA

MATERIAL IS NONFLAMMARLE. NITROGEN NEITHER BURNS NOR SUP-PORTS COMBUSTION. USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE FIGHTING PROCEDURES

NONE. NITROGEN WILL ACT AS A SIMPLE ASPHYXIANT IF IT DISPLACES OXYGEN. IF POSSIBLE, REMOVE NITROGEN CYLINDERS FROM FIRE AREA OR COOL WITH WATER TO AVOID EXCESSIVE PRESSURE BUILDUP. SELF-CONTAINED BREATHING APPARATUS MAY BE REQUIRED FOR RESCUE WORKERS.

UNUSUAL FIRE AND EXPLOSION HAZARD

2

PAGE

AIR LIGUIDE AMERICA CORPORATION P. O. BUX 3047 HOUSTON: TX 77253

RIAL SAFETY DATA SHEET PRODUCT NAME 'NÎTROĞEÑ

PRESSURE CAN BUILD UP DUE TO HEAT AND CYLINDER MAY EXPLODE IF PRESSURE RELIEF DEVICES SHOULD FAIL TO RELIEVE PRESSURE.

AUTOIGNITION TEMPERATURE: N/A

ELECTRICAL CLASSIFICATION: NONHAZARDOUS

V-HFALTH HAZARD DATA

THRESHOLD LIMIT VALUE

NONE ESTABLISHED

UNUSUAL CHRONIC TOXICITY

SEE OVEREXPOSURE SECTION

CARCINOGENICITY

NOT LISTED BY IARC. NTP, USHA

ROUTES OF EXPOSURE

INHALATION

EFFECTS OF OVEREXPOSURE

NITROGEN IS NONTOXIC. BUT MAY CAUSE SUFFOCATION BY DIS-PLACING THE OXYGEN IN THE AIR. EXPOSURE TO OXYGEN-DEFICIENT ATMOSPHERES MAY CAUSE DIZZINESS. NAUSEA. VOMITING. DIMINI-SHED MENTAL ALERTNESS. LOSS OF CONSCIOUSNESS. AND DEATH. IT SHOULD BE RECOGNIZED THAT COLLAPSE AND ASPHYXIATION MAY DCCUR WITHOUT EXPERIENCING ANY OF THE ABOVE SYMPTOMS.

TOXICOLOGICAL PROPERTIES:

NITROGEN IS A SIMPLE ASPHYXIANT.

EMERGENCY AND FIRST AID PROCEDURES

PERSONS SUFFERING FROM LACK OF OXYGEN SHOULD BE MOVED INTO FRESH AIR. IF VICTIM IS NOT BREATHING. ADMINISTER ARTI-FICIAL RESPIRATION. IF BREATHING IS DIFFICULT. ADMINISTER OBTAIN PROMPT MEDICAL ATTENTION.

SELF-CONTAINED BREATHING APPARATUS MAY BE REQUIRED FOR RES-ÇÜE KÜRKERS.

VI-REACTIVITY DATA

STABILITY STABLE

CONDITIONS TO AVOID

NONE.

INCOMPATABILITY (MATERIALS TO AVOID)

NONE.

HAZARDOUS DECOMPOSITION PRODUCTS

NONE.

HAZARDOUS POLYMERIZATION WILL NOT OCCUR

CONDITIONS TO AVOID

AIR LIQUIDE AMERICA CORPORATION P. D. BOX 3047 HOUSTON: TX 77253

PRODUCT NAME NITROGEN

NONE.

VII-SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

EVACUATE ALL UNNECESSARY PERSONNEL FROM AFFECTED AREA. SHUT OFF SOURCE OF NITROGEN IF POSSIBLE. VENTILATE ENCLOSED AREAS OR REMOVE CYLINDERS TO AN OUTDOOR LOCATION TO PREVENT FORMATION OF OXYGEN-DEFICIENT ATMOSPHERES. IF LEAKING FROM CONTAINER OR VALVE. CONTACT THE CLOSEST BIG THREE INDUSTRIES LOCATION. OR YOUR SUPPLIER.

WASTE DISPUSAL METHOD

DO NOT ATTEMPT TO DISPOSE OF RESIDUAL OR UNUSED QUANTITIES. RETURN TO YOUR SUPPLIER FOR DISPOSAL. FOR EMERGENCY DISPOSAL. SECURE CYLINDER AND VENT SLOWLY TO THE ATMOSPHERE IN A WELL-VENTILATED AREA OR OUTDOORS.

VIII-SPECIAL PROTECTIVE INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE)

USE SELF-CONTAINED BREATHING APPARATUS OR POSITIVE PRESSURE AIR LINE WITH MASK IN OXYGEN-DEFICIENT ATMOSPHERES. RESPIRATORS WILL NOT FUNCTION.

VENTILATION

SEE NOTES

PROTECTIVE GLOVES

N/A

EYE PROTECTION

SAFETY GLASSES ARE RECOMMENDED WHEN HANDLING HIGH PRESSURE CYLINDERS.

OTHER PROTECTIVE EQUIPMENT

SAFETY SHOES WHEN HANDLING CYLINDERS.

ADEQUATE TO AVOID LOWERING OXYGEN CONTENT TO BELOW 19.5 % (OXGYEN-DEFICIENT ATMOSPHERE).

LOCAL EXHAUST: YES MECHANICAL: YES

IX-SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

STORE AND USE WITH ADEQUATE VENTILATION. CYLINDERS SHOULD BE STORED UPRIGHT WITH VALVE PROTECTION CAP IN PLACE AND

AIR LIQUIDE AMERICA CORPORATION P. 0. 80X 3047 HOUSTON: TX 77253

PRODUCT NAME MATER SAFETY DATA SHEET IAL

FIRMLY SECURED TO PREVENT FALLING OR BEING KNOCKED DVER. PROTECT CYLINDERS FROM PHYSICAL DAMAGE: DO NOT DRAG. ROLL. SLIDE, OR DROP. USE A SUITABLE HAND TRUCK FOR CYLINDER MOVEMENT. DO NOT ALLOW THE TEMPERATURE WHERE CYLINDERS ARE STORED TO EXCEED 125 F (52 C).

D.O.T. LABELING

NONFLAMMABLE GAS - GREEN LABEL

VALVE CONNECTION

580

OTHER PRECAUTIONS

NEVER STRIKE A WELDING ARC ON ANY COMPRESSED GAS CYLINDER. REFILLING CYLINDERS WITHOUT THE CONSENT OF THE CYLINDER OWNER IS A VIGLATION OF FEDERAL LAW (49 CFR).

DOT PLACARD: NONFLAMMABLE GAS

DOT PROPER SHIPPING NAME: NITROGEN. COMPRESSED

MISCELLANEOUS INFURMATION:

FURTHER INFORMATION ABOUT NITROGEN CAN BE FOUND IN THE FOLLOWING PAMPHLETS PUBLISHED BY:

THE COMPRESSED GAS ASSOCIATION (CGA) 1235 JEFFERSON DAVIS HIGHWAY ARLINGTON, VA 22202 (703) 979-4341

"SAFE HANDLING OF COMPRESSED GASES IN CONTAINERS"
"THE INERT GASES ARGON. NITROGEN, AND HELIUM"
"ACCIDENT PREVENTION IN OXYGEN-RICH AND OXYGENDEFICIENT ATMOSPHERES" G-10.1: P-1: " P-9: " P-14:

"OXYGEN DEFICIENT ATMOSPHERES" SB-2:

NEPA PATINGS: HEALTH: FLAMMABILITY: REACTIVITY: Ō 0 2 IMH RATINGS: HEALTH: FLAMMABILITY: REACTIVITY: CERCLA RATINGS: HEALTH: FIRE:0 REACTIVITY: PERSISTANCE: 0

LISTED IN TSCA INVENTORY:

THIS PRODUCT SAFETY DATA SHEET IS OFFERED SOLFLY FOR YOUR INFORMATION. CONSIDERATION. INVESTIGATION. IN COMPLIANCE WITH HAZARD COMMUNICATION STANDARD 29 CFR 1900.1200. AIR LIQUIDE AMERICA CORPORATION PROVIDES NO WARRANTIES. EITHER EXPRESS OR IMPLIED.

1

SAFETY DATA SHEET MATERIAL

I-GENERAL INFERMATION

PROLLET NAME NITREGEN. REFRIGERATED LIGUID

EMERGENCY TELEPHONE NO. 713-868-U302
MANUFACTURERS NAME AIR LIGUIDE AMERICA CORP.
IRADE NAME/SYNONYMS LIGUID NITRUGEN (LIN)
CHEMICAL NAME AND SYNONYMS
NITRUGEN. REFRIGERATED LIGUID
REVISION CATE: 08/24/85
PRODUCT TO. UN

PRODUCT IC. UN 1977 FCRMULA CAS NUMBER 7727-37-9 CHEMICAL FAMILY INERT GAS

******* SECTION NOTES *******

> MSDS INFORMATION NUMBER: (713) 850-2140

> > II-HAZAROOUS INGREDIENIS

> > > HAZARUCUS MIXTURES OF LIGUIOS AND GASES

C/C ILV

NITROGEN ** NENE ESTABLISHED

ICC **‡** ‡

III-PHYSICAL DATA

PCILING PCINI -32C.4F (-195.8C) & 1 ATM SPECIFIC GRAVITY (H2G = 1): 0.8083 & BUILING PT. & 1 ATM WAFLE PRESSURE N/A PERCENT VCLATILE BY VCLUME (0/0) N/A CENSITY 5C.49 LB/CL FT & BUILING PT. & 1 ATM ENSITY 5C.49 LB/CL FT & BUILING PT. & 1 ATM EVAPERATION RATE SCLUBILITY IN WATER N/A
MATERIAL AT NORMAL CONCILION LIQUID
EXPANSION RATIO (LICUID TO GAS) 14 1.656.5

APPEARANCE AND CLER

CCLCRLESS. CCCRLESS GAS

IV-FIRE AND EXPLOSION HAZARU UATA

FLASH PLINI FLASH PCINI N/A
FLASH PCINI (METHCO USED)
FLAMMABILITY LIMITS IN AIR (U/O BY VCL) LOWER N/A

LPPER N/A

EXTINGUISHING MEDIA

MATERIAL IS NONFLAMMABLE. NITROGEN NEITHER BURNS NOR SUP-PORTS COMBUSTION. USE EXTINGUISHING MEDIA APPROPRIATE FOR SURRCUNDING FIRE.

SPECIAL FIRE FIGHTING PROCEDURES

NCNE. NITROGEN WILL ACT AS A SIMPLE ASPHYXIANT IT IT DIS-PLACES CXYGEN. LICUID NITROGEN WHEN SPILLED WILL VAPORIZE RAPILLY CAUSING A VAPOR CLOUD THAT WILL CREATE AN CXYGEN-GEFICIENT ATMOSPHERE. EVACUATE THE AREA OF THIS VAPOR CLOUD UNLESS WEARING SELF-CUNTAINED BREATHING APPARATUS.

LNUSUAL FIRE AND EXPLOSION HAZARD

CONTACT AITH "COLD" LIQUID OR GASECUS NITROGEN MAY CAUSE PROSIBITE. VISIBILITY MAY BE GESCURED IN THIS "VAPOR CLUCE".

AUTOTGNITION TEMPERATURE: N/A

PRODUCT NAME NITROGEN, REFRIGERATED LICUID

ÉLECTRICAL CLASSIFICATION: NUNHAZARUOUS

V-HEALTH HAZARE CATA

THRESHOLD LIMIT VALUE

UNUSUAL CHRONIC TOXICITY

CARCINGGENICITY

RUUTES OF EXPOSURE

NONE ESTABLISHED

SEE GVEREXPOSURE SECTION

NCT LISTED BY IARD. NIP. USHA

INHALATION. EYE/SKIN CONTACT

EFFECTS OF OVEREXPOSURE

NITAGEN IS NONTOXIC. BUT MAY CAUSE SUFFOCATION BY DISPLACING THE CAYGEN IN THE AIR. EXPOSURE TO OXYGEN-DEFICIENT ATMUSPHERES MAY CAUSE DIZZINESS. NAUSEA. VONITING. DIPINISHED MENTAL ALERTNESS. LOSS OF CONSCIGUSNESS. AND DEATH. IT SHOULL WE RECLIGATED THAT COLLAPSE AND ASPHYXIATION MAY OCCUR MITHOUT EXPERIENCING ANY OF THE ABOVE SYMPTOMS. PROLONGED EXPERTENCING ANY OF THE ABOVE SYMPTOMS. PROLONGED EXPERTENCING OF VERY COLD ATMOSPHERES CAN CAUSE LUNG DAMAGE AND HYPOTHERMIA. FROZEN TISSUES. CAUSED BY FROSTELTE ARE PAINLESS AND APPEAR MAXY WITH A POSSIBLE YELLOW COLOR. THEY MILL BECOME SHOLLEN. PAINFUL. AND PRONE TO INFECTION MEN THAMED.

TUXICCLOGICAL PROPERTIES.

NITROGEN IS A SIMPLE ASPHYXIANI.

CENTACT AITH CELD LIQUID OR PIPING MAY CAUSE COLD CONTACT BURNS, "FRESIBITE".

EMERGENCY AND FIRST AID PROCEDURES

PERSONS SUFFERING FROM LACK OF CXYGEN SHOULD BE MOVED INTO FRESH ALR. IF VICTIM IS NOT BREATHING. ADMINISTER ARTI-FICIAL RESPIRATION. IF BREATHING IS DIFFICULT. ADMINISTER GXYGEN. CBIAIN PROMPT MEDICAL ATTENTION.

SELF-CONTAINED BREATHING APPARATUS MAY BE RECUIRED FOR RES-CLE BCRKERS.

IF CONTACT WITH CRYOGENIC LIQUID NITHUGEN HAS CAUSED FROST-BITE, DG NOT RUE THE AFFECTED AREA. AS TISSUE CAMAGE MAY CCCUR. FLUSH THE AFFECTED AREAS WITH WARM WATER. DG NOT USE HOT WATER. CRIAIN PROMPT MEDICAL ATTENTION.

VI-REACTIVITY DATA

STABILITY STABLE

CONDITIONS TO AVOID

NONE -

INCOMPATABILITY (MATERIALS TO AVEID)

VEVE-

HAZARCOUS GECUMPOSITION PRODUCTS

KENE.

AIR LIQUIDE AMERICA CGRPCRATION P. C. BCX 3047
HOUSIGN: TX 77253

NITEGEN, REFRIGERATED LICUID A TA PRODUCT NAME

HAZARCGUS POLYMERIZATION WILL NOT CCCUR

CUNDITIONS TO AVEID

NONE.

LEAK PROCEDURES VII-SFILL C R

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

EVACLATE ALL UNNECESSARY PERSONNEL FROM VAPOR CLOUD AREA WHERE AN GXYGEN-GEFICIENT ATMOSPHERE IS PROBABLE. SHIT OFF NITROGEN SUURCE IF POSSIBLE. AVOID CONTACT WITH LIQUID ALTREGEN OR ITS COLD BOIL-OFF GAS. IC INCREASE RATE OF EVAPORATION SPRAY WITH LARGE AMOUNTS OF WATER FROM UPWIND. IF LEAKING FROM CONTAINER OR CONNECTION. CONTACT THE CLOSEST BIG INREE INCUSTRIES LOCATION. OR YOUR SUPPLIER. SELF-CONTAINED BREATHING APPARATUS WILL BE REQUIRED IN CXYGEN-CEFICIENT AREAS SUCH AS NITROGEN VAPOR CLOUDS.

WASTE DISPUSAL METHOD

DC NLT ATTEMPT TO DISPOSE OF RESIDUAL OR UNUSED QUANTITIES. RETURN TO YOUR SUPPLIER FOR DISPOSAL. FOR EMERGENCY DISPOSAL. FOR EMERGENCY DISPOSAL, ALLER LICUID NITROGEN TO EVAPORATE IN A WELL-VENTILATED CUTOCOR LOCATION.

VIII-SPECIAL PROTECTIVE INFORMATION

RESPIRATURY PROTECTION (SPECIFY TYPE)

USE SELF-CONTAINED BREATHING APPARATUS OR POSITIVE PRESSURE AIR LINE WITH MASK IN OXYGEN-DEFICIENT AIMOSPHERES. RESPIRATORS WILL NOT FUNCTION.

VENTILATION

SEE NOTES

PROTECTIVE GLOVES

LOGSE-FITTING THERMAL INSULATED/LEATHER

EYE PROTECTION

FULL FACE SHIELD AND SAFETY GLASSES ARE RECEMPENCED WHEN HANDLING N2 LIQUID

CTHER PROTECTIVE ECLIPMENT

LUNG SLEEVE SHIRT FOR LIQUID HANDLING. SAFETY SHOES IF HANDLING CYLINDERS.

*** SECTION NOTES ****

ADECLATE TO AVOID LOWERING GXYGEN CONTENT TO BELC. 19.5 & (GXYGEN-DEFICIENT ATMOSPHERE).

LCCAL EXHAUST-MECHANICAL: Y

IX-SPELLAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND SICRING

PRODUCT NAME NITROGEN. REFRIGERATED LIQUID

SIGRE AND USE WITH ADEQUATE VENITLATION. CONTAINERS SHOULD BE SICRED UPRIGHT AND FIRMLY SECURED TO PREVENT FALLING CR BEING KNOCKED OVER. PROTECT CONTAINERS FROM PHYSICAL GAMAGE: UC NOT DRAG. ROLL. SLIDE. CR DROP. USE A SUITABLE HAND TRUCK FOR CONTAINER MOVEMENT. LIGUID CONTAINERS (1.8.4. 4L CYLINGERS) WILL VENT NITROGEN IF INTERNAL PRESSURE BUILDS UP A SUITABLE STORED IN WELL-VENTILATED UP, SC AREAS.

C.U.I. LABELING

NONFLAMMABLE GAS - GREEN LABEL

VALVE CLANECIICA

295 FCR LIGUID. 580 FOR GAS

CTHER PRECAUTIONS

LIQUIL NITROGEN EXPANDS AT A RATIC OF 696.5 TO 1. AND IF IRAPPED IN A CONTAINER OR PIPE. IT WILL PRODUCE ENCRNOUS PRESSURES WHICH WILL RUPIURE THE CONTAINER. ANY AREA WHERE LIQUID NITROGEN COULD BE TRAPPED MUST BE PROTECTED BY A PRESSURE RELIEF DEVICE. PIPING MUST BE DESIGNED FOR EXTREME COLD. MANY MATERIALS, SUCH AS CARBON STEEL. WILL BECOME BRITTLE AND MAY FRACTURE WHEN EXTREMELY COLD. DO NOT TOUCH COLD. PIPING AS FROSTBITE MAY OCCUR.

DET FLACARD: NCNFLAMMABLE GAS

UCT PROPER SHIPPING NAME: NITROGEN. REFRIGERATED LICUID

MISCELLANEOUS INFORMATION:

FURTHER INFORMATION ABOUT LIGUID NITRUGEN CAN BE FOUNC IN THE FOLICHING PAPPHLETS PUBLISHED BY:

THE COMPRESSED GAS ASSOCIATION (CGA) 1235 JEFFERSON DAVIS HIGHWAY ARLINGION. VA 22202 (703) 979-4341

G-13-1: "CCM#CDITY SPECIFICATION FOR NITROGEN"
P-1- "SAFE HANCLING OF COMPRESSED GASES IN CONTAINERS"
P-9: "THE INERT GASES ARGON. NITROGEN. AND HELIUM"
P-12: "SAFE HANCLING OF CRYOGENIC LIDUIO"
P-14- "ACCICENT PREVENTION IN GXYGEN-RICH AND GXYGENCEFICIENT ATMOSPHERES"

CEFICIENT ATMOSPHERES"
"GXYGEN-DEFICIENT ATMOSPHERES"
"SAFE HANCLING OF LIQUEFIED NITROGEN & ARGON" S8-2: Av-5:

NEPA KATINGS: HEALTH: FLAPMABILITY = REACTIVITY:

HMIS RATINGS: HEALTH: FLAMMABILITY: REACTIVITY:

CERCLA RATINGS: HEALTH: FIRE. REACTIVITY: PERSISTANCE:

LISTED IN ISCA INVENIORY: YES

AIR LIGUIDE AMERICA CORPORATION HOUSTON: TX 77253

PRODUCT NAME NITROGER. REFRIGERATED LIGUTO A TA SHEET

THIS PRODUCT SAFETY DATA SHEET IS OFFERED SCLELY FOR YOUR INFORMATION. CONSIDERATION. INVESTIGATION. IN COMPLIANCE WITH HAZARD COMMUNICATION STANDARD 29 CFR 1960-1200. AIR LIQUIDE AMERICA CORP. PROVIDES NO WARRANTIES, EITHER EXPRESS OR IMPLIED.

PURCHASE ORDER MASTERCARD ORDER

MATERIAL SAFETY DAIA SHEET

I - G E N E R A L I N E O R M A T I O N

PRODUCT NAME OXYGEN

t

EMERGENCY TELEPHONE NO. 713-868-0302
MANUFACTURERS NAME AIR LIQUIDE AMERICA CORP.
TRADE NAME/SYNONYMS GXYGEN: OXYGEN USP: AVIATORS BREATHING OXYGEN (ABO)
CHEMICAL NAME AND SYNONYMS

OXYGEN

OXYGEN

REVISION DATE: 09/05/89 CHEMICAL FAMILY GXIDIZER PRODUCT ID. UN 1072 FORMULA 02 CAS FAMILY 7782-44-7

******** SECTION NOTES *******

MSDS INFORMATION NUMBER: (713) 896-2140

II-HAZARDOUS INGREDIENTS

HAZARDOUS MIXTURES OF LIQUIDS AND GASES

0/0 1FA

OXYGEN ** NONE ESTABLISHED

100 **

III-PHYSICAL DATA

BOILING POINT -297.3F (-183.0C) 3 1 ATM SPECIFIC GRAVITY (AIR = 1): 1.1049 3 70F (21.1C) & 1 ATM VAPOR PRESSURE N/A PERCENT VULATILE BY VOLUME (3/0) N/A (GAS) DENSITY 0.08279 LB/CU FT 3 70 F (21.1 C) & 1 ATM EVAPORATION RATE N/A (GAS) SULUBILITY IN WATER 4.89SCC/100CC H20 3 32 F (0 C) MATERIAL AT NORMAL CONDITION GAS EXPANSION RATIO (LIQUID TO GAS) N/A (GAS)

APPEARANCE AND ODOR

COLORLESS. ODORLESS. TASTELESS GAS

IV-FIRE AND EXPLOSION HAZARD DATA

FLASH POINT N/A
FLASH POINT (METHOD USFO)
FLAMMABILITY LINITS IN AIR (0/0 BY VOL) LOWER N/A

UPPER N/A

EXTINGUISHING MEDIA

MATERIAL IS NONELAMMABLE. USE EXTINGUISHING MEDIA APPRO-PRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE FIGHTING PROCEDURES

THOUGH NOT FLAMMABLE ITSELF, OXYGEN VIGOROUSLY ACCELERATES COMBUSTION. IF POSSIBLE, SHUL OFF OXYGEN GAS AND REMOVE CYLINDERS FROM FIRE AREA OR COOL WITH WATER TO AVOID EXCESSIVE PRESSURE BUILD UP.

UNUSUAL FIRE AND EXPLOSION HAZARD

MATERIALS WHICH DO NOT BURN IN AIR MAY BURN IN AN OXYGEN-

PRODUCT NAME OXYGEN

MATERIAL SAFETY DATA SHFET

ENRICHED ATMOSPHERE WHERE THE DXYGEN CONTENT EXCEEDS 21%. OXYGEN MAY FORM EXPLOSIVE COMPOUNDS WHEN EXPOSED TO COMBUSTIBLE MATERIALS OR OIL. GREASE. AND OTHER HYDROCARBON MATERIALS. PRESSURE CAN BUILD UP DUE TO HEAT AND CYLINDER MAY EXPLODE IF PRESSURE RELIEF DEVICES SHOULD FAIL TO RELIEVE PRESSURE.

V-HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

NONE ESTABLISHED

UNUSUAL CHRONIC TOXICITY

SEE OVEREXPOSURE SECTION

CARCINUGENICITY

NOT LISTED BY TARC. NTP. OSHA

ROUTES OF EXPOSURE

INHALATION

EFFECTS OF OVEREXPOSURE

BREATHING BOX OR MORE DXYGEN AT ATMOSPHERIC PRESSURE FOR MORE THAN A FEW HOURS MAY CAUSE NASAL STUFFINESS. COUGH, SORE THROAT, CHEST PAIN AND BREATHING DIFFICULTY. BREATHING DXYGEN AT HIGHER PRESSURE INCREASES THE LIKELIHOOD OF AD-VERSE EFFECTS WITHIN A SHORTER TIME PERIOD. EXPOSURE TO OXYGEN AT HIGHER PRESSURES FOR PROLONGED PERIODS HAS BEEN FOUND TO AFFECT VISION. NEUROMUSCULAR COORDINATION AND ATTENTIVE POWERS.

TOXICOLOGICAL PROPERTIFS:

AT NORMAL CONCENTRATION AND PRESSURE, GXYGEN POSES NO TOXI-CITY HAZARDS. HOWEVER, AT ELEVATED CONCENTRATIONS AND PRES-SURES, DXYGEN MAY CAUSE ADVERSE EFFECTS (SEE ABOVE).

EMERGENCY AND FIRST AID PROCEDURES

REDUCE OXYGEN PRESSURES TO 1 ATM AND/OR MOVE VICTIM INTO FRESH AIR.

RESCUE PERSONNEL SHOULD BE AWARE OF EXTREME FIRE HAZARDS ASSOCIATED WITH DXYGEN-ENRICHED ATMOSPHERES.

VI-REACTIVITY DATA

STABILITY STABLE

1000

CONDITIONS TO AVOID

NCNE.

INCOMPATABILITY (MATERIALS TO AVOID)

DXYGEN REACTS EXPLOSIVELY WITH ETHERS, ALCOHOLS, AND HYDRO-CARBON MATERIALS. KEEP DXYGEN CONTAINERS FREE OF DIL AND/ORGREASE.

HAZARDOUS DECOMPOSITION PRODUCTS

NONE.

PAGE 3

PRODUCT NAME DXYGEN SAFETY DATA SHEET

HAZARDOUS POLYMERIZATION WILL NOT OCCUR

CONDITIONS TO AVOID

NONE.

VII-SPILL OR L'EAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

EVACUATE ALL UNNECESSARY PERSONNEL FRUM AFFECTED AREA. SHUT OFF SOURCE OF OXYGEN IF POSSIBLE. VENTILATE AREA TO PREVENT CXYGEN-ENRICHED ATMOSPHERE. REMOVE SOURCES OF HEAT OR IGNITION. IF LEAKING FROM CONTAINER OR VALVE. CONTACT THE CLOSEST BIG THREE INDUSTRIES LOCATION. OR YOUR SUPPLIER.

WASTE DISPOSAL METHOD

DO NOT ATTEMPT TO DISPOSE OF RESIDUAL OR UNUSED QUANTITIES. RETURN TO YOUR SUPPLIER FOR DISPOSAL. FOR EMERGENCY DISPOSAL, SECURE THE CYLINDER AND BLOW DOWN SLOWLY TO THE ATMOSPHERE IN A WELL-VENTILATED AREA OR OUTDOORS.

VIII-SPECIAL PROTECTIVE INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE)

NUNE.

VENTILATION

NATURAL OR MECHANICAL WHERE GAS IS PRESENT -- *SEE NOTES*

PROTECTIVE GLOVES

IF USED. MUST BE CLEAN AND GREASE FREE

EYE PROTECTION

SAFETY GLASSES ARE RECOMMENDED WHEN HANDLING HIGH PRESSURE CYLINDERS.

OTHER PROTECTIVE EQUIPMENT

SAFETY SHOES WHEN HANDLING CYLINDERS.

******* SECTION NOTES ****

> SUFFICIENT TO PREVENT OXYGEN-ENRICHED ATMOSPHERES OF OVER 21% OXYGEN. LOCAL EXHAUST:

> > IX-SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STURING

STORE AND USE WITH ADEQUATE VENTILATION. OXGYEN IS HEAVIER THAN AIR AND LEAKING GAS COULD ACCUMULATE IN LOW AREAS OR CONFINED SPACES CAUSING AN OXYGEN-ENRICHED ATMOSPHERE. CYLINDERS SHOULD BE STORED UPRIGHT WITH VALVE PROTECTION CAP

AIR LIQUIDE AMERICA CORPORATION P. O. BOX 3047 HOUSTON: TX 77253

PRODUCT NAME DXYGEN SAFETY DATA SHEET RIAL

IN PLACE AND FIRMLY SECURED TO PREVENT FALLING OR BEING KNOCKED OVER. PROTECT CYLINDERS FROM PHYSICAL DAMAGE: DO NOT DRAG, ROLL, SLIDE, OR DROP. USE A SUITABLE HAND TRUCK FOR CYLINDER MOVEMENT. DO NOT ALLOW THE TEMPERATURE WHERE CYLINDERS ARE STORED TO EXCEED 125 F 152 C1. DO NOT STORE DXYGEN CLOSER THAN 20 FEET FROM FLAMMABLE OR COMBUSTIBLE MATERIALS. KEEP CYLINDERS FREE FROM OIL AND GREASE.

D.O.T. LABELING

DXYGEN --- YELLOW LABEL

VALVE CONNECTION

CGA 540 OR CGA 970 (PIN INDEXED)

OTHER PRECAUTIONS

ALL GAUGES, VALVES, REGULATORS, PIPING AND EQUIPMENT TO BE USED IN CXYGEN SERVICE MUST BE CLEANED FOR OXYGEN SERVICE ACCORDANCE HITH CGA PAMPHLET G-4.L. UXYGEN IS NOT TO BE USED AS A SUBSTITUTE FOR COMPRESSED AIR, NEVER STRIKE A WELDING ARC ON ANY COMPRESSED GAS CYLINDER, REFILLING CYLINDERS WITHOUT THE CONSENT OF THE CYLINDER OWNER IS A VIOLATION OF FEDERAL LAW (49 CFR).

DOT PLACARD: OXYGEN

DOT PROPER SHIPPING NAME: UXYGEN, COMPRESSED

MISCELLANEOUS INFORMATION:

FURTHER INFORMATION ABOUT OXYGEN CAN BE FOUND IN THE FOLLOWING PAMPHLETS PUBLISHED BY:

THE COMPRESSED GAS ASSOCIATION (CGA) 1235 JEFFERSON DAVIS HIGHWAY ARLINGTON. VA 22202 (703) 979-4341

G-4.3: G-4: G-4:1: "COMMODITY SPECIFICATION TO COMMODITY SPECIFICATION TO COMMODITY SPECIFICATION TO COMPRESSED GASES IN CONTAINERS"
"SAFE CLEANING OF COMPRESSED GASES IN CONTAINERS"
"ACCIDENT PREVENTION IN OXYGEN-RICH AND OXYGENDEFICIENT ATMOSPHERES"
"USE OF OXY-FUFL GAS WELDING AND CUTTING APPARATUS"
"CHARACTERISTICS AND SAFE HANDLING OF CRYOGENIC
LIQUID AND GASEOUS OXYGEN" "COMMODITY SPECIFICATION FOR OXYGEN" Ď−1:

:8-VA

NEPA RATINGS:
HEALTH:
FLAMMABILITY:
REACTIVITY:

HMIS RATINGS: HE AL TH: FLAMMABILITY: REACTIVITY:

CERCLA RATINGS: HEALTH: 0 FIRE: REACTIVITY: PERSISTANCE:

LISTED IN TSCA INVENTORY: YES

5

PRODUCT NAME DAYGEN

THIS PRODUCT SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION, INVESTIGATION, IN COMPLIANCE WITH HAZARD COMMUNICATION STANDARD 29 CFR 1900-1200. AIR LIQUIDE AMERICA CURPORATION PROVIDES NO WARRANTIES. EITHER EXPRESS OR IMPLIED.

* PHECHASE ORDER 2024594 HV

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MATERIAL SAFETY DATA SHEET

I-GENERAL INFORMATION

PRODUCT NAME OXYGEN, REFRIGERATED LIQUID

EMERGENCY TELEPHONE NO. 713-868-0302 MANUFACTURERS NAME AIR LIGHTDE AMERICA CORP. TRADE NAME/SYNONYMS LIQUID OXYGEN (LOX)

CHEMICAL NAME AND SYNDNYMS DXYGEN. REFRIGERATED LIQUID

REVISION DATE: 09/05/89 CHEMICAL FAMILY OXIDIZER PRODUCT 10. UN 1073 FORMULA CAS FAMILY 7782-44-7

**** SECTION HOTES +***

MSDS INFORMATION NUMBER: (713) 896-2140

II-HAZARDOUS INGREDIENTS

0/0 HAZARDOUS MIXTURES OF LIQUIDS AND GASES TLV

OXYGEN ** NONE FSTABLISHED

100

III-PHYSICAL DATA

BOILING POINT -297.3F (-183.0C) @ 1 ATM SPECIFIC GRAVITY (H20 = 1): 1.14 @ BOILING PT & 1 ATM VAPOR PRESSURE N/A PERCENT VOLATILE BY VOLUME (0/0) N/A DENSITY 71.22 LB/CU FT @ BOILING PT & 1 ATM EVAPORATION MATE N/A EVAPORATION KATE N/A
SOLUBILITY IN WATER N/A
MATERIAL AT NORMAL CONDITION LIQUID
EXPANSION RATIO (LIQUID TO GAS) L: 1:860.6

APPEARANCE AND DOOR

PALE BLUE, CODRLESS LIQUID

IV-FIRE AND EXPLOSION HAZARD DATA

FLASH POINT N/A FLASH POINT (METHOD USED) FLAMMABILITY LIMITS IN AIR (O/O BY VOL) LOWER N/A

UPPER N/A

EXTINGUISHING MEDIA

MATERIAL IS NONFLAMMABLE. USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE FIGHTING PROCEDURES

THOUGH NOT FLAMMABLE ITSELF. DXYGEN VIGOROUSLY ACCELERATES COMBUSTION. LIQUID DXYGEN, WHEN SPILLED, WILL EVAPORATE RAPIDLY CAUSING A VAPOR CLOUD THAT WILL BE HIGHLY UXYGEN-ENRICHED, WHICH CAN CAUSE MATERIALS IN THIS CLOUD TO IGNITE EASILY. EVACUATE THE CLOUD AREA AND REMOVE ANY IGNITION EASILY. SOURCES.

UNUSUAL FIRE AND EXPLOSION HAZARD

ALR LIQUIUF AMERICA CORPORATION P. 0. BUX 3047 HOUSTUN. TX 77253

PRODUCT NAME OXYGEN. REFRIGERATED LIQUID ĘΕ DATA SHEET

MATERIALS WHICH DO NOT BURN IN AIR MAY BURN IN CXYGEN-ENRICHED AIMOSPHERES WHERE THE OXYGEN CONTENT EXCEEDS 21%. OXYGEN MAY FORM EXPLOSIVE COMPOUNDS WHEN EXPOSED TO COM-BUSTIBLE MATERIALS OR OIL. GREASE. AND OTHER HYDROCARBON MATERIALS. CONTACT WITH "CULD" REFRIGERATED LIQUID MAY CAUSE FROSTRITE. VISIBILITY MAY BE OBSCURED IN THIS VAPOR CLOUD.

AUTOIGNITION TEAPERATURE: M/A

ÉLECTRICAL CLASSIFICATION: NONHAZARDOUS

V-HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

UNUSUAL CHRONIC TOXICITY

CARCINGGENICITY

ROUTES OF EXPOSURE

NONE ESTABLISHED

SEE OVEREXPOSURE SECTION

NOT LISTED BY TARC. NTP, USHA

INHALATION. EYE/SKIN CONTACT

EFFECTS OF OVEREXPOSURE

CONTACT WITH LIQUID OXYGEN CAN CAUSE SEVERE FROSTBITE AND FREEZE BURNS. PROLONGED BREATHING OF VERY COLD ATMOSPHERES CAN CAUSE LUNG DAMAGE AND HYPOTHERMIA. BREATHING 80% OR MORE OXYGEN AT ATMOSPHERIC PRESSURE FOR MORE THAN A FEW HOURS MAY CAUSE NASAL STUFFINESS. COUGH. SORE THROAT. CHEST PAIN AND BREATHING DIFFICULTY. BREATHING UXYGEN AT HIGHER PRESSURE INCREASES THE LIKELIHOOD OF ADVERSE EFFECTS WITHIN A SHORTER TIME PERIOD. EXPOSURE TO OXYGEN AT HIGHER PRESSURES FOR PROLONGED PERIODS HAS BEEN FOUND TO AFFECT VISION. NEUROMUSCULAR COORDINATION. AND ATTENTIVE POWERS. VISION.

TOXICOLOGICAL PROPERTIES:

AT NURMAL CONCENTRATION AND PRESSURE; DXYGEN POSES NO TOXI-CITY HAZARDS. HOWEVER, AT ELEVATED CONCENTRATIONS AND PRES-SURES, DXYGEN MAY CAUSE ADVERSE EFFECTS (SEE ABOVE).

EMERGENCY AND FIRST AID PROCEDURES

REDUCE OXYGEN PRESSURES TO 1 ATM AND/OR MOVE VICTIM INTO FRESH AIR.

RESCUE PERSONNEL SHOULD BE AWARE OF EXTREME FIRE HAZARDS ASSUCIATED WITH OXYGEN-ENRICHED ATMOSPHERES.

IF CONTACT WITH CRYOGENIC CIOUID OXYGEN HAS CAUSED FROSTBITE DO NOT RUB THE AFFECTED AREAS WITH WARM WATER. DO NOT USE HOT WATER. USTAIN PROMPT MEDICAL ATTENTION.

VI-REACTIVITY DATA

STABLLITY STABLE CONDITIONS TO AVOID

P. O. BOX 3047 n. dux HOUSTEN.

LATERIAL SAFETY OXYGEN, REFRIGERATED LIQUID DATA SHEET PRUDUCT NAME

MONE.

INCUMPATABILITY (MATERIALS TO AVGIO)

OXYGEN REACTS EXPLOSIVELY WITH ETHERS, ALCOHOLS, AND HYDRO-CARBON MATERIALS, KEEP OXYGEN CONTAINERS FREE OF OIL AND/OR CARBON MATERIALS. -GREASE.

HAZARDOUS DECOMPOSITION PRODUCTS

NUNE .

HAZARDOUS POLYMERIZATION WILL NOT OCCUR

CONDITIONS TO AVOID

MONE.

VII-SPILL OR LEAK PRUCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

EVACUATE ALL UNNECESSARY PERSONNEL FROM VAPOR CLOUD AREA WHERE AN OXYGEN-ENRICHED AIMOSPHERE IS FORMED. AND ELIMINATE ANY SOURCES OF HEAT OR IGNITION. SHUT OFF SOURCE OF OXYGEN IF POSSIBLE. VENTILATE AREA TO PREVENT OXYGEN-ENRICHED ATMOSPHERE. AVOID CONTACT WITH LIQUID DXYGEN OR ITS COLD BOIL-DEE GAS. TO INCREASE RATE OF EVAPORATION, SPRAY WITH LARGE AMOUNTS OF WATER FROM UPWIND. IF LEAKING FROM CONTACT THE CLOSEST RIG THREE INDUSTRIES LOCATION, OR YOUR SUPPLIER. ATMOSPHERE. AVOI BOIL-OFF GAS. TO LARGE AMOUNTS OF

WASTE DESPOSAL METHOD

DO NOT ATTEMPT TO DISPOSE OF RESIDUAL OR UNUSED QUANTITIES. RETURN TO YOUR SUPPLIER FOR DISPOSAL. FOR EMERGENCY DISPOSAL, ALLOW LIQUID DXYGEN TO EVAPORATE IN A WELL-VENTILATED. CLEAN (GREASE-FREE). DUTDOOR LOCATION. KEEP AREA FREE FROM SPARKS OR FLAMES AND ANY HYDROCARBON MATERIALS.

VIII-SPECIAL PROTECTIVE INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE)

NONE.

VENTILATION

NATURAL OR MECHANICAL WHERE GAS IS PRESENT -- *SEE NOTES*

PROTECTIVE GLOVES

SEE NOTES

EYE PROTECTION

FULL FACE SHIELD AND SAFETY GLASSES ARE RECOMMENDED WHEN HANDLING LIQUID OXYGEN.

OTHER PROTECTIVE EQUIPMENT

MATERIAL SAFETY DATA SHFET PRODUCT NAME OXYGEN, REFRIGERATED LIQUID

LONG SLEEVE SHIRT FOR LIQUID HANDLING. SAFETY SHOES IF HANDLING CYLINDERS.

******* SECTION NOTES ******

LOCAL EXHAUST: SUFFICIENT TO PREVENT DXYGEN-ENRICHED ATMOSPHERES OF EVER 21% DXYGEN.

GLOVES: LOCSE FITTING THERMAL INSULATED OR LEATHER. GLOVES MUST BE CLEAN AND GREASE FREE.

IX-SPECIAL PRECAUTIUNS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

SIGRE AND USE WITH ADEQUATE VENTILATION. OXYGEN IS HEAVIER THAN AIR AND LEAKING GAS CAN ACCUMULATE IN LOW AREAS OR CONFINED SPACES CAUSING AN OXYGEN-ENRICHED ATMOSPHERE. CONFIAINERS SHOULD BE STORED UPRIGHT AND FIRMLY SECURED TO PREVENT FALLING OR BEING KNOCKED OVER. PROTECT CONTAINERS FROM PHYSICAL DAMAGE: DO NOT DRAG. ROLL. SLIDE OR DROP. USE A SUITABLE HAND TRUCK. FOR CONTAINER MOVEMENT. LIQUID CONTAINERS (1.E.: 4L CYLINDERS) WILL VENT OXYGEN IF INTERNAL PRESSURE BUILDS UP. SO THESE CONTAINERS SHOULD BE STORED IN WELL-VENTILATED AREAS. BULK OXYGEN STORAGE MUSI MEET EXPOSURE SEPARATION REQUIREMENTS OUTLINED IN NEPA PAMPHLET 50.

D.O.T. LABELING

OXYGEN -- YELLOW LABEL

VALVE CONNECTION

440 FUR LIQUID: 540 FOR GAS

OTHER PRECAUTIONS

LIQUID OXYGEN EXPANDS AT A RATID OF 860.6 - 1. AND IF TRAPPED IN A CONTAINER OR PIPE. II WILL PRODUCE ENDRHOUS PRESSURES WHICH WILL RUPTURE THE CONTAINER. ANY AREA WHERE LIQUID OXYGEN COULD BE TRAPPED MUST BE PROTECTED BY A PRESSURE RELIEF DEVICE. PIPING MUST BE DESIGNED FOR EXTREME CULD. MANY MATERIALS. SUCH AS CARBON STELL. WILL BECOME BRITTLE AND MAY FRACTURE WHEN EXTREMELY COLD. DO NOT TOUCH COLD PIPING. AS FROSTBITE MAY OCCUR. ALL GAUGES. VALVES, REGULATORS. PIPING AND EQUIPMENT TO BE USED IN OXYGEN SERVICE MUST BE CLEANED FOR OXYGEN SERVICE IN ACCORDANCE WITH CGA PAMPHLET G-4.1.

DOT PLACARD: OXYGEN

DOT PROPER SHIPPING NAME: OXYGEN. REFRIGERATED LIQUID

MISCELLANEOUS INFORMATION:

FURTHER INFORMATION ABOUT LIQUID OXYGEN CAN BE FOUND IN THE FOLLOWING PAMPHLETS PUBLISHED BY:

THE COMPRESSED GAS ASSOCIATION (CGA) 1235 JEFFERSON DAVIS HIGHWAY ARLINGTON, VA 22202 (703) 979-4341

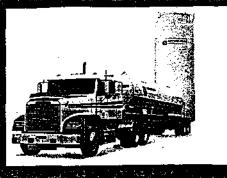
G-4.3: "COMMODITY SPECIFICATION FOR OXYGEN"

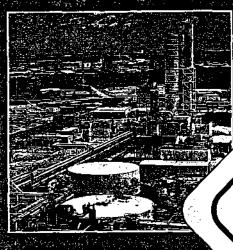
PRODUCT NAME OXYGEN. REFRIGERATED LIQUID

G-4: "OXYGEN"
G-4: "CLEANING FOULPMENT FUR OXYGEN SERVICE"
P-1: "SAFE HANDLING OF COMPRESSED GASES IN CONTAINERS"
P-12: "SAFE HANDLING OF COMPRESSED GASES IN CONTAINERS"
P-14: "ACCIDENT PREVENTION IN OXYGEN-RICH AND OXYGEN-DEFICIENT ATMOSPHERES"
SB-8: "USE OF OXY-FUEL GAS WELDING AND CUTTING APPARATUS"
AV-8: "CHARACTERISTICS AND SAFE HANDLING OF CRYOGENIC LIQUID AND GASEOUS GXYGEN"

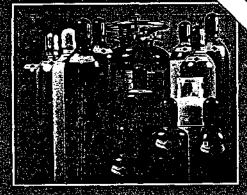
NFPA RATINGS:
HEALTH:
HEALTH:
FLAMMABILITY:
OREACTIVITY:
OREA

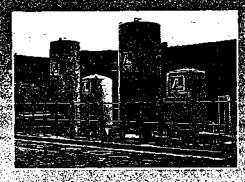
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SAFETY PRECAUTIONS





HOW TO SAFELY
HANDLE AND USE
LIQUEFIED AND
COMPRESSED GASES



SAFETY PRECAUTIONS

xygen, nitrogen, argon,
helium, compressed air,
carbon dioxide, nitrous oxide,
hydrogen, acetylene, and specialty
gases have properties that can cause
serious accidents injuries; and even
death (proper precautions and safety
practices are not followed. Always use
mornation: bundhin Material Safety
Data streats (MSDS) and hexappiteable
entire remainly is velles intraum.

THIS SAFETY PRECAUTION
PAMPHLET IS OFFERED SOLELY FOR
YOUR INFORMATION, CONSIDERATION
AND INVESTIGATION. THE COMPANY
PROVIDES NO WARRANTIES, EITHER
EXPRESS OR IMPLIED, AND ASSUMES
NO RESPONSIBILITY FOR THE
ACCURACY OR COMPLETENESS OF
THE DATA CONTAINED HEREIN.

THE FOLLOWING PROCEDURES SHOULD BE OBSERVED WHEN HANDLING COMPRESSED GAS CYLINDERS OR LIQUEFIED GAS CONTAINERS.



Read the label on all cylinders or containers before use to identify their contents. If the label is not legible or is missing, do not assume that the cylinder contains a particular gas, but return the cylinder to the gas supplier.

NEVER RELY ON THE COLOR OF THE CYLINDER TO IDENTIFY ITS CONTENTS.





Observe all warnings and safety precautions set forth on the cylinder label.



Always secure cylinders in storage and use. Never remove the valve protection cap until the cylinder is secured (chained, tied, etc.) and ready for use.

W A R N I N G

IF A CYLINDER IS KNOCKED OVER AFTER

THE CAP IS REMOVED, THE VALVE COULD BE

BROKEN OFF CAUSING THE CYLINDER TO BE

PROPELLED VIOLENTLY.



Never attempt to lift a cylinder by the valve protection cap.



Never attempt to transfer any gas from one cylinder to another or to mix any gases in a cylinder.



Always use a pressure-reducing regulator when withdrawing any gaseous product from a cylinder or other high pressure source. To minimize the chance of injury, stand to one side of the regulator when opening the cylinder valve.



Containers of liquefied compressed gases such as oxygen, nitrogen, argon, helium, hydrogen, carbon dioxide, and nitrous oxide must be kept in an upright position and secured to prevent them from being knocked over.

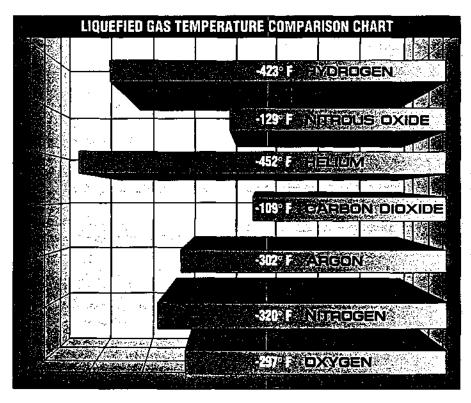


Never use an adaptor to connect a cylinder valve to a regulator or other piece of equipment. Specific valve outlet connections have been designed for most gases to prevent misuse and contamination. For further information, see CGA



Always use a cart when moving cylinders or liquelied gas containers.

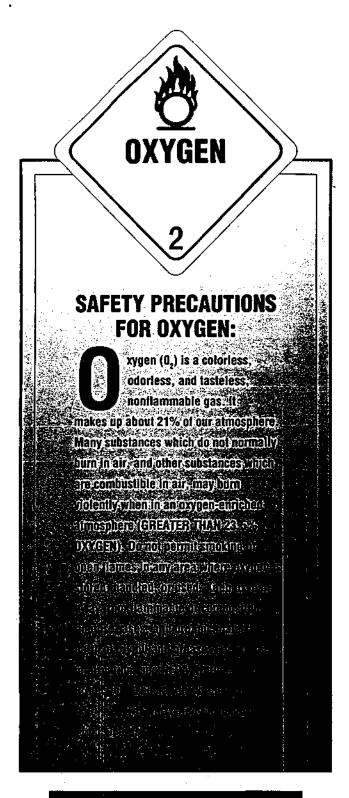
(Compressed Gas Association) / ANSI (American National Standards Institute) pamphlet V-1, "Compressed Cylinder Outlet and Inlet Connections".



10

Liquefied
gases are
extremely cold
and these
liquids or their
cold "boil-off"
vapors can "

cause cold contact burns or "frostbite". In addition, many materials such as carbon steel will become brittle and may fracture when exposed to these cold temperatures. Piping for these cold liquids must be designed for extreme cold.



W A R N I N G
WHILE OXYGEN IS NONFLAMMABLE, IT
SUPPORTS AND CAN GREATLY ACCELERATE
COMBUSTION. KEEP COMBUSTIBLES AND
IGNITION SOURCES AWAY FROM WHERE
OXYGEN IS BEING USED OR STORED.

KEEP ALL SURFACES WHICH MAY COME IN CONTACT WITH OXYGEN CLEAN TO PREVENT IGNITION.

Even normal industrial soot and dirt can constitute a combustion hazard in the presence of oxygen. Do not place liquid oxygen equipment on asphalt or on any surface which may have oil or grease deposits. If liquid oxygen is spilled, do not walk on or roll equipment over the spill. Use cleaning agents which will not leave organic deposits on the cleaned surfaces. In handling equipment which may come in contact with oxygen, use only clean, lint-free gloves or hands washed clean of oil. Never lubricate oxygen valves, regulators, gauges, or fittings with oil, grease, or other lubricants that are not oxygen compatible. Check with your lubricant manufacturer or oxygen supplier for a source of oxygen compatible lubricants.

W A R N I N G
LIQUID OXYGEN IS EXTREMELY COLD
(- 297.0 °F), AND AS A LIQUID OR
COLD GAS MAY CAUSE SEVERE
FROSTBITE TO THE EYES OR SKIN.

Do not touch frosted pipes or valves. If accidental eye or skin contact with liquid oxygen occurs, consult a physician at once. Do not rub frozen body parts, as tissue damage may result. Remove any clothing that may restrict circulation to the frozen area. As soon as practical, place the affected part of the body in a warm water bath which has a temperature not to exceed 105°F (40°C). Never use dry heat.

PROTECT EYES AND SKIN.

Always handle liquid so that it will not splash or spill. Protect your eyes with safety goggles or face shield, and cover the skin to prevent contact with the liquid or cold gas. Clean, protective gloves that can be quickly and easily removed, and long sleeves are recommended for arm protection. Cuffless trousers should be worn outside of boots or work shoes to shed spilled liquid. If clothing should be splashed with liquid oxygen or otherwise saturated with oxygen gas, it should not be considered safe to wear for at least 30 minutes, since it can be easily ignited while the concentrated oxygen remains.

LIQUID-TO-GAS EXPANSION

Cryogenic liquids produce large quantities of gas when they vaporize. Liquid oxygen will expand at a ratio of 1:860, liquid to gas. If liquid oxygen is trapped in a sealed container or piping, it will vaporize producing enormous pressures which could cause the container to rupture violently if not protected by a pressure relief device.

VAPOR CLOUD OR FOG

Cryogenic liquids and their "boil-off" vapors are extremely cold and have a built-in warning property that appears whenever they are exposed to the atmosphere. The cold "boil-off" gases condense the moisture in the air, creating a highly visible fog or vapor cloud. This fog normally extends over a larger area than the vaporizing gas.

If a large vapor cloud forms after a liquid spill, you should avoid this cloud because of possible oxygen enriched atmospheres or reduced visibility. In addition, all sources of ignition should be shut off in the path of the oxygen vapor cloud, if possible.

Small fog areas may appear during liquid transfer as the cold piping condenses moisture in the surrounding air.

STORE OXYGEN CYLINDERS AND LIQUEFIED OXYGEN CONTAINERS IN ACCORDANCE WITH APPLICABLE SAFETY CODES.

Oxygen in storage must be separated from flammable liquids or gases and combustible materials (especially oil or grease), a minimum distance of 20 feet unless separated by a noncombustible barrier at least 5 feet high and having a fire resistance rating of at least one-half hour. For more information, see NFPA Standard No. 50, "Bulk Oxygen Systems At Consumer Sites".

MAINTAIN ADEQUATE VENTILATION.

Adequate ventilation must be provided to prevent accumulation of oxygen and minimize combustion hazards in areas where oxygen is used and stored.

CONTAINERS, EQUIPMENT, AND REPLACEMENT PARTS MUST BE SUITABLE FOR OXYGEN SERVICE.

Use only equipment, cylinders, containers and apparatus designed and approved for use with oxygen. Many materials, especially some non-metallic gaskets and seals, constitute a combustion hazard when in oxygen service, although they may be acceptable for use with other gases. Make no substitutions for recommended equipment, and be sure all replacement parts are compatible with oxygen and cleaned for oxygen service. Keep repair parts in sealed, clean plastic bags until ready for use.

REGULATORS

Before attaching a regulator to a cylinder, visually inspect the cylinder valve outlet very carefully for traces of dirt, dust, oil or grease. Remove dirt and dust with a clean cloth, but if oil or grease is detected, do not use the cylinder; return it to your supplier. Before attaching the regulator to the cylinder valve, crack the cylinder valve momentarily to blow out any dust or

dirt that might have accumulated in the valve outlet. Visually inspect the regulator and the inlet connection to ensure that they are free of dirt, oil, grease or other hydrocarbon-type contaminants. These contaminants may ignite and burn violently when the cylinder valve is opened. Dirt and dust should be removed with a clean cloth. However, oil and grease cannot be easily removed, and the regulator should be returned to an authorized service facility for proper cleaning. Connect the regulator to the valve, back out the pressure-adjusting screw until it turns freely, open the cylinder valve slowly until maximum pressure is indicated on the high pressure gauge, then open the cylinder valve all the way to eliminate possible leaks through the packing. To minimize the chance of injury, stand to one side of the regulator when opening the cylinder valve.

W A B N I N G
REGULATORS WHICH HAVE BEEN USED WITH
FLAMMABLE GASES SHOULD NEVER BE USED
FOR OXYGEN SERVICE UNLESS CLEANED BY
AUTHORIZED PERSONNEL.

OBSERVE ALL APPLICABLE SAFETY CODES WHEN INSTALLING OXYGEN EQUIPMENT.

Follow the recommendations of the NFPA Standard No. 50, "Bulk Oxygen Systems at Consumer Sites", NFPA Standard No. 51, "Oxygen-Fuel-Gas Systems for Cutting and Welding", American National Standards Institute Pamphlet No. Z49.1, "Safety In Welding and Cutting", and with all local safety codes when installing oxygen equipment or oxygen piping.

OXYGEN FOR MEDICAL USE

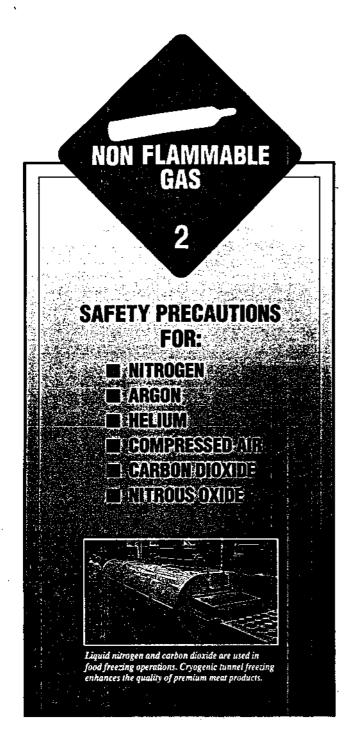
Oxygen should be used for medical use only if it is labeled: "Oxygen U.S.P.", and it is administered by qualified persons; and, except in emergencies, under doctor's prescription.

For further information about medical gas systems, consult NFPA Standard No. 99, "Health Care Facilities".

Oxygen should never be substituted for breathing air when air supplied respiratory protection is used since regulators used in this service may contain substances which are not compatible with oxygen and may result in an explosion.

IF IT IS NECESSARY TO DISPOSE OF WASTE GAS OR LIQUID, EXERCISE CAUTION.

Gaseous oxygen should be released only outdoors away from personnel, combustible materials, and sources of ignition. Liquid oxygen should be dumped into an outdoor pit filled with clean, grease and oil-free gravel, where it will evaporate safely.



NITROGEN, ARGON, AND HELIUM SAFETY PRECAUTIONS

Nitrogen (N_1) , argon (Ar), and helium (He) are inert, colorless, odorless, tasteless and nonflammable gases. The atmosphere that we breathe contains 21% oxygen, 78% nitrogen, 1% argon and trace amounts of other gases such as helium.

W A R N I N G

NITROGEN, ARGON, AND HELIUM ARE
NONTOXIC, BUT THEY CAN CAUSE
ASPHYXIATION AND DEATH IN CONFINED,
POORLY VENTILATED AREAS BY
DISPLACING THE OXYGEN WHICH IS
NECESSARY TO SUSTAIN LIFE.

Atmospheres which do not contain enough oxygen for breathing (at least 19.5%) can cause dizziness, unconsciousness, or even death.

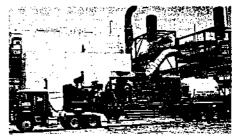
Nitrogen, argon, and helium cannot be detected by the human senses and will be inhaled like air. If adequate ventilation is not provided, these gases may displace normal air without warning. Store containers outdoors or in other well-ventilated areas. Never enter any tank, pit, or other confined area where these gases may be present until purged with air and tested for a breathable atmosphere (at least 19.5% oxygen) using an oxygen analyzer.

W A R N I N G
LIQUID NITROGEN (- 320.4 °F),
ARGON (- 302.5 °F), AND HELIUM (- 452.0 °F)
ARE EXTREMELY COLD, AND AS LIQUIDS
OR COLD GASES CAN CAUSE SEVERE
FROSTBITE TO THE EYES OR SKIN.

Do not touch frosted pipes or valves. If accidental eye or skin contact with cryogenic liquids occur, consult a physician at once. Do not rub frozen body parts, as tissue damage may result. Remove any clothing that may restrict circulation to the frozen area. As soon as practical, place the affected part of the body in a warm water bath which has a temperature not to exceed 105°F (40°C). Never use dry heat.

PROTECT EYES AND SKIM.

Always handle liquid so that it will not splash or spill. Protect your eyes with safety goggles or face shield, and cover the skin to prevent contact with the liquid or cold gas. Protective gloves that can be quickly and easily removed and long sleeves are recommended for arm protection. Wear cuffless trousers outside boots or over work shoes to shed spilled liquid.



High pressure mobile units respond to special applications for nitrogen and oxygen.

LIQUID-TO-GAS EXPANSION

Cryogenic liquids produce large quantities of gas when they vaporize. Liquid nitrogen will expand at a ratio of 1:696 liquid to gas, liquid argon will expand at a ratio of 1:842 liquid to gas, and liquid helium will expand at a ratio of 1:745 liquid to gas. If liquid nitrogen, argon or helium is trapped in a sealed container or piping, it will vaporize producing enormous pressures which could cause the container to rupture violently if not protected by a pressure relief device.

VAPOR CLOUD OR FOG

Cryogenic liquids and their "boil-off" vapors are extremely cold and have a built-in warning property that appears whenever they are exposed to the atmosphere. The cold "boil-off" gases condense the moisture in the air, creating a highly visible fog or vapor cloud. This fog normally extends over a larger area than the vaporizing gas.

If a large vapor cloud forms after a liquid spill, you should avoid this cloud because of possible oxygen deficient atmospheres or reduced visibility.

Small fog areas may appear during liquid transfer as the cold piping condenses moisture in the surrounding air.

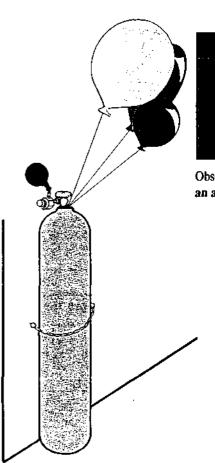
LIQUID HELIUM SPECIAL PRECAUTIONS

The extremely low temperature of liquid helium (- 452.0 °F) can solidify any gas including air. Such solidified gases can plug pressure-relief passages and devices making them ineffective in relieving excess pressure from evaporating liquid. Always store and handle liquid helium under positive pressure and in closed systems to prevent infiltration and solidification of air or other gases.

Keep exterior surfaces of liquid helium equipment clean. Oxygen can condense from the air on exposed liquid helium or cold-gas equipment surfaces, such as vaporizers and piping. To prevent the possible ignition of grease, oil, or other combustible materials with the condensed oxygen, keep these surfaces clean.

IF IT IS NECESSARY TO DISPOSE OF WASTE GAS OR LIQUID, EXERCISE CAUTION.

Gaseous nitrogen, argon, or helium should be released only in an outdoor area. Liquid nitrogen, argon or helium should be released into an outdoor pit filled with clean, grease and oilfree gravel, where it will evaporate rapidly and safely.



HELIUM BALLOON WARNING

HELIUM BALLOONS AND BALLOON FILLING EQUIPMENT ARE OFTEN MISUSED IN AN ATTEMPT TO ALTER VOICE CHARACTERISTICS BY INHALING HELIUM TO TALK LIKE "DONALO DUCK".

THIS IS AN EXTREMELY DANGEROUS PROCEDURE WHICH HAS RESULTED IN DEATHS THROUGH SUFFOCATION AND/OR LUNG DAMAGE.

Observe the following precautions when handling helium cylinders for balloon filling. Don't let an accident spoil the fun of using helium filled balloons.

- Read and follow the safety precautions that appear on the cylinder label.
- Use only a regulator which is designed for balloon filling.
- Store and use helium cylinders in a well ventilated area, and transport cylinders only in well ventilated vehicles. Helium gas is odorless and non-toxic, but can cause suffocation by displacing the oxygen you breathe.
- Never remove the cylinder valve protection cap until the cylinder is secured (chained, tied, etc.) in an upright position and ready for use.
- Do not breathe helium from the cylinders, filling regulators or from helium filled balloons.
- Never allow children to operate balloon filling equipment.
- Close the cylinder valve after each use and when empty.
- Never leave the cylinder unattended with the regulator attached.



COMPRESSED AIR SAFETY PRECAUTIONS

Compressed air is a colorless, odorless, tasteless and nonflammable gas that is produced by compression and filtration of atmospheric air or by synthetically mixing 21% oxygen and 79% nitrogen.

W A R N I N G

COMPRESSED AIR IS NONFLAMMABLE;

HOWEVER, IT WILL SUPPORT COMBUSTION.

WHEN UNDER PRESSURE, IT CAN EVEN

ACCELERATE COMBUSTION.

BREATHING AIR

When using compressed air for breathing, ensure that you have a source of air (cylinder or compressor) that meets or exceeds the specification for CGA "Grade D" air that is required by OSHA.



Fire fighters using breathing air in self-contained breathing apparatus (SCBA).

Oxygen should never be substituted for breathing air when airsupplied respiratory protection is used since regulators used in this service may contain substances which are not compatible with oxygen and may result in an explosion.

AIR FOR MEDICAL USE

If air is used for medical purposes, then you must use a medical grade of air "Compressed Air U.S.P.".

SPECIAL PRECAUTIONS FOR COMPRESSED AIR

Compressed air is often used to power pneumatic tools. Under no circumstances should oxygen be substituted for air to power tools since these tools contain lubricants which are not oxygen compatible and could cause an explosion resulting in severe injury or death.



CARBON DIOXIDE SAFETY PRECAUTIONS

Carbon dioxide (CO₂) is a colorless, odorless and nonflammable gas with a slightly acidic taste.

W A R N I N G

CARBON DIOXIDE CAN CAUSE ASPHYXIATION
AND DEATH IN CONFINED, POORLY VENTILATED
AREAS BY DISPLACING THE OXYGEN WHICH IS
NECESSARY TO SUSTAIN LIFE.

Concentrations of 10% carbon dioxide or greater will cause unconsciousness or death, without regard to oxygen concentration. In addition to the asphyxiation hazard, carbon dioxide acts as a stimulant and depressant on the central nervous system. At lower concentrations, increases in heart rate and blood pressure have been noted, and labored breathing, headaches, and dizziness may occur if exposure is prolonged, regardless of oxygen content. OSHA has adopted an 8-hour Permissible Exposure Limit (PEL), also known as Time Weighted Average (TWA) of 5,000 ppm (0.5%) for carbon dioxide. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a Short Term Exposure Limit (STEL) of 30,000 ppm (3%). Persons should not be permitted in areas with concentrations above these levels.

Carbon dioxide cannot be detected by the human senses and will be inhaled like air. If adequate ventilation is not provided, it may displace normal air without warning. Since carbon dioxide is more dense than air, high concentrations can persist in open pits, tanks, or low areas. Before entering any tank, pit, or other confined area where carbon dioxide may be present, carbon dioxide monitoring should be performed. If carbon dioxide is present, the area should be purged with air, or an air supplied respirator should be worn. Store containers outdoors or in other well-ventilated areas to avoid the accumulation of potentially harmful concentrations.

W A R N I N G
WHEN LIQUID CARBON DIOXIDE IS RELEASED TO
THE ATMOSPHERE, IT FORMS SOLID CARBON
DIOXIDE (DRY ICE) WHICH IS EXTREMELY
COLD (-109.3 °F) AND CAN CAUSE SEVERE
FROSTBITE TO THE EYES OR SKIN.

Do not touch frosted pipes or valves. If accidental eye or skin contact with cold gas or dry ice occurs, consult a physician at once. Do not rub frozen body parts, as tissue damage may result. Remove any clothing that may restrict circulation to the frozen area. As soon as practical, place the affected part of the

body in a warm water bath which has a temperature not to exceed 105°F (40°C). Never use dry heat.

PROTECT EYES AND SKIN.

Protect your eyes with safety goggles and face shield, and cover the skin to prevent contact with the liquid, cold gas or solid. Protective gloves that can be quickly and easily removed and long sleeves are recommended for arm protection.

CARBON DIOXIDE SPECIAL PRECAUTIONS

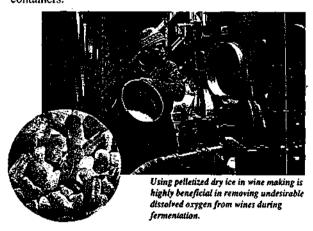
For small uses, carbon dioxide service is by withdrawal of gas from a cylinder. A small number of cylinders are equipped with a siphon or dip tube for liquid withdrawal. NEVER CONNECT A REGULATOR TO A CYLINDER EQUIPPED WITH A SIPHON OR DIP TUBE. The liquid will flash to gas and rupture the regulator. Cylinders equipped with siphon or dip tubes are identified by "siphon tube" stenciled on the cylinder sidewall.

SOLID CARBON DIOXIDE (DRY ICE) SPECIAL PRECAUTIONS

Dry ice is an extremely cold solid (-109.3 °F). Avoid contact with exposed flesh as it can cause severe frosbite. Wear suitable clothing and gloves when handling dry ice.

Dry ice evaporates (sublimes) to form carbon dioxide gas which does not support life. Do not breathe gas. Store and use dry ice with adequate ventilation.

Do not store dry ice in tight containers. Pressure will develop as the dry ice evaporates which could burst air tight containers.



IF IT IS NECESSARY TO DISPOSE OF WASTE GAS OR SOLID, EXERCISE CAUTION.

Carbon dioxide gas should be released only in an outdoor, well ventilated area. Allow dry ice to sublime (evaporate from solid to gas) in an outdoor, well ventilated area.



Nitrous oxide (N₂O) is a colorless and nonflammable gas with a slightly sweetish odor and taste. Nitrous oxide is widely used as an anesthetic gas in concentrations of up to 50% with oxygen.

W A R N I N G

HITROUS OXIDE IS CLASSIFIED A SIMPLE
ASPHYXIANT THAT CAN CAUSE DEATH IN
CONFINED, POORLY VENTILATED AREAS BY
DISPLACING THE OXYGEN WHICH IS
NECESSARY TO SUSTAIN LIFE.

Atmospheres which do not contain enough oxygen for breathing (at least 19.5%) can cause dizziness, unconsciousness and death. When nitrous oxide is inhaled in high concentrations for a few seconds, it affects the central nervous system and may induce symptoms resembling intoxication, hence its nickname "Laughing Gas".

W A R N I N G

BECAUSE OF ITS WIDELY KNOWN INTOXICATING
EFFECT, THIS GAS HAS OFTEN BEEN MISUSED
RESULTING IN DEATH DUE TO SUFFOCATION.
IT IS IMPORTANT THAT SECURITY OF NITROUS
OXIDE CYLINDERS BE CONSIDERED TO
PREVENT THEFT AND MISUSE.

Although nitrous oxide is classified as a simple asphyxiant (nontoxic), there are studies that suggest a link to certain health hazards from long-term exposure to high concentrations of nitrous oxide in the operating room or dental office. Because of these studies, the ACGIH (American Conference of Governmental Industrial Hygienists) has recommended a TLV of 50 ppm and the NIOSH (National Institute for Occupational Safety and Health) has recommended a maximum exposure on an 8-hour time weighted average (TWA) of 25 ppm for anesthesia administration and 50 ppm for dental offices. REFER TO YOUR MATERIAL SAFETY DATA SHEET FOR MORE DETAILED INFORMATION ON THE HEALTH HAZARDS OF NITROUS OXIDE.

W A R N I N G
WHILE NITROUS OXIDE IS NONFLAMMABLE,
IT SUPPORTS AND CAN GREATLY
ACCELERATE COMBUSTION IN A
MANNER SIMILAR TO OXYGEN.

Nitrous oxide in storage must be separated from flammable liquids or gases and combustible materials (especially oil or grease) a minimum distance of 20 feet unless separated by a noncombustible barrier at least 5 feet high having a fire rating of at least one-half hour.

W A R N I N G
LIQUID NITROUS OXIDE IS VERY COLD
(-129.1°F), AND AS A LIQUID OR COLD GAS
MAY CAUSE FROSTBITE TO THE EYES OR SKIN.

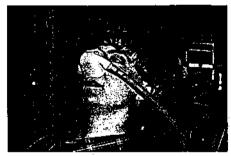
Do not touch frosted pipes or valves. If accidental eye or skin contact with liquid nitrous oxide occurs, consult a physician at once. Do not rub frozen body parts, as tissue damage may result. Remove any clothing that may restrict circulation to the frozen area. As soon as practical, place the affected part of the body in a warm water bath which has a temperature not to exceed 105°F (40°C). Never use dry heat.

PROTECT EYES AND SKIN.

Always handle liquid nitrous oxide so that it will not splash or spill. Protect eyes with safety goggles or face shield, and cover the skin to prevent contact with the liquid or cold gas. Clean, protective gloves that can be quickly and easily removed and long sleeves are recommended for arm protection. Cuffless trousers should be worn outside of boots or work shoes to shed spilled liquid.

NITROUS OXIDE FOR MEDICAL USE

Nitrous oxide should be used for anesthetic purposes only if it is labeled "Nitrous Oxide, U.S.P.", and it is administered by licensed practitioners.



Nitrous Oxide is routinely used as an anesthetic gas in medical and dental applications.

IF IT IS NECESSSARY TO DISPOSE OF WASTE GAS OR LIQUID, EXERCISE CAUTION.

Gaseous and liquid nitrous oxide should be released only outdoors, downwind from personnel, combustible materials and sources of ignition.



HYDROGEN SAFETY PRECAUTIONS

Hydrogen (H₂) is a colorless, odorless, tasteless, nontoxic and flammable gas. It is the lightest of all elements.

W A R N I N G

HYDROGEN IS A FLAMMABLE GAS. A MIXTURE
OF HYDROGEN WITH OXYGEN OR AIR IN
A CONFINED SPACE WILL EXPLODE IF
IGNITED BY A SPARK, FLAME, OR
OTHER SOURCE OF IGNITION.

KEEP HYDROGEN AWAY FROM SOURCES OF IGNITION, AND DO NOT PERMIT ANY ACCUMULATION OF GAS.

Because it is lighter than air, hydrogen has a tendency to accumulate in the upper portions of confined areas. Concentrations of hydrogen between 4% and 75% by volume in air are relatively easy to ignite by a low-energy spark and may cause an explosion. Smoking, open flames, sparks, unapproved electrical equipment, and other ignition sources must not be permitted in hydrogen areas. Store containers outdoors or in a well-ventilated area away from ignition sources, flammable materials and oxidizers such as oxygen and nitrous oxide.

KEEP EQUIPMENT AREA WELL VENTILATED.

Although hydrogen is nontoxic, it can cause asphyxiation in a confined area that does not have adequate ventilation. Hydrogen gas cannot be detected by human senses; and if adequate ventilation is not provided, may displace normal air without warning. Any atmosphere which does not contain enough oxygen for breathing (at least 19.5%) can cause dizziness, unconsciousness, or even death. Store containers outdoors, or in other well ventilated areas. Never enter any tank, pit, or other confined area where hydrogen may be present until purged with air and tested to ensure that it has an oxygen content between 19.5% and 23.5%. In addition, the confined space must be tested to ensure that there are no flammable gases present that exceed 10% of their Lower Explosive Limit (LEL).

TAKE EVERY PRECAUTION AGAINST HYDROGEN LEAKS. ESCAPING HYDROGEN CANNOT BE DETECTED BY SMELL OR TASTE, HYDROGEN LEAKING UNDER PRESSURE CAN IGNITE DUE TO FRICTION AND WILL BURN WITH AN ALMOST INVISIBLE BLUE FLAME.

All hydrogen connections should be leak checked using a leak detection solution before use. NEVER USE A FLAME TO DETECT HYDROGEN LEAKS!

W A R N I N G
LIQUID HYDROGEN IS EXTREMELY
COLD (- 423.0 °F) AND AS A LIQUID OR
COLD GAS MAY CAUSE SEVERE FROSTBITE
TO THE EYES OR SKIN.

Do not touch frosted pipes or valves. If accidental eye or skin contact with liquid hydrogen occurs, consult a physician at once. Do not rub frozen body parts, as tissue damage may result. Remove any clothing that may restrict circulation to the frozen area. As soon as practical, place the affected part of the body in a warm water bath which has a temperature not to exceed 105°F (40°C). Never use dry heat.

PROTECT SKIN AND EYES.

Always handle liquid hydrogen so that it will not splash or spill. Protect your eyes with safety goggles or face shield, and cover the skin to prevent contact with the liquid or cold gas. Clean, protective gloves that can be quickly and easily removed, and long sleeves are recommended for arm protection. Cuffless trousers should be worn outside boots or work shoes to shed spilled liquid.

LIQUID-TO-GAS EXPANSION

Cryogenic fiquids produce large quantities of gas when they vaporize. Liquid hydrogen will expand at a ratio of 1:850, liquid to gas. If liquid hydrogen is trapped in a sealed container or piping, it will vaporize, producing enormous pressures which could cause the container to rupture violently if not protected by a pressure relief device.

VAPOR CLOUD OR FOG

Cryogenic liquids and their "boil-off" vapors are extremely cold and have a built-in warning property that appears whenever they are exposed to the atmosphere. The cold "boil-off" gases condense the moisture in the air, creating a highly visible fog or vapor cloud. This fog normally extends over a larger area than the vaporizing gas.

If a large vapor cloud forms after a liquid spill, you should avoid this cloud because of possible flammable atmospheres or reduced visibility. In addition, all sources of ignition should be shut off in the path of the vapor cloud, if possible.

Small fog areas may appear during liquid transfer as the cold piping condenses moisture in the surrounding air.

LIQUID HYDROGEN SPECIAL PRECAUTIONS

The extremely low temperature of liquid hydrogen (- 423.0 °F) can solidify any gas except helium. Such solidified gases can plug pressure-relief passages and devices, making them ineffective in relieving excess pressure from evaporating liquid. Always store and handle liquid hydrogen under positive pressure and in closed systems to prevent infiltration and solidification of air or other gases.

Keep exterior surfaces of liquid hydrogen equipment clean. Oxygen can condense from the air on exposed liquid hydrogen or cold-gas equipment surfaces, such as vaporizers and piping. To prevent the possible ignition of grease, oil, or other combustible materials with the condensed oxygen, keep these surfaces clean.

NEVER USE CONTAINERS, EQUIPMENT, OR REPLACE-MENT PARTS OTHER THAN THOSE SPECIFICALLY DESIGNATED FOR USE IN HYDROGEN SERVICE.

Observe all applicable safety codes when installing hydrogen equipment.

Follow the recommendations contained in NFPA Standards 50A, "Gaseous Hydrogen Systems at Consumer Sites", and 50B, "Liquefied Hydrogen Systems at Consumer Sites", and with all local safety codes when installing hydrogen equipment or systems.

IF IT IS NECESSARY TO DISPOSE OF WASTE GAS OR LIQUID, EXERCISE CAUTION.

Liquid and gaseous hydrogen must be disposed of outdoors in an isolated area away from personnel, combustible materials, and ignition sources. Liquid hydrogen for disposal should be completely vaporized and the vapor vented in a safe manner. Remember that a flammable mixture will exist for some distance downwind of the disposal area. A shallow aluminum pan makes a suitable flash evaporator for disposal of moderately small quantities of liquid hydrogen.



ACETYLENE SAFETY PRECAUTIONS

Acetylene (C₂H₂) is a colorless, non-toxic, flammable gas with a distinctive garlic-like odor.

W A R N I N G
ACETYLENE IS A FLAMMABLE GAS.
A MIXTURE OF ACETYLENE WITH OXYGEN OR
AIR IN A CONFINED AREA WILL EXPLODE IF
IGNITED BY A SPARK, FLAME OR OTHER
SOURCE OF IGNITION.

KEEP ACETYLENE AWAY FROM SOURCES OF IGNITION, AND DO NOT PERMIT ANY ACCUMULATION OF GAS.

Concentrations of acetylene between 2.5% and 81% by volume in air are relatively easy to ignite by low-energy sparks and may cause an explosion. Smoking, open flames, sparks, unapproved electrical equipment and other ignition sources must not be permitted in acetylene storage areas. Store cylinders outdoors or in other well ventilated areas away from ignition sources, other flammable materials, and oxidizers such as oxygen and nitrous oxide.

NEVER USE EQUIPMENT OR CYLINDERS THAT ARE LEAKING ACETYLENE

Be certain that the regulator-to-cylinder valve, hose-to-regulator and the torch-to-hose connections are leak tight by leak checking with a leak detection solution before starting work. NEVER USE A FLAME TO DETECT ACETYLENE LEAKS!

Regulators, hoses, and torches must be properly maintained to work correctly and safely. If an acetylene valve should leak around the cylinder-valve stem when the valve is opened, close the valve and tighten the packing gland nut. If this does not stop the leak, contact the supplier immediately.

DO NOT TAMPER WITH FUSIBLE METAL PRESSURE RELIEF DEVICES OR CYLINDER VALVES.

Acetylene cylinders are equipped with fusible metal pressure relief devices which melt at about 212 °F, the boiling point of water. These devices are designed to release the acetylene in the event of an abnormally high temperature, as in a fire. These fusible metal pressure relief devices are threaded into the top and/or bottom of most cylinders. Fusible-metal channels may also be provided in the valve body on smaller cylinders. Do not tamper with these fusible metal pressure relief devices or permit a torch flame to come in contact with them. Keep cylinders away from overhead and ground-level welding and cutting operations to prevent flying sparks and slag from accumulating on or around the cylinder which could cause fusible metal pressure relief devices to melt, releasing acetylene which could be ignited.

Protect all cylinders from falling objects and avoid rough handling of cylinders to prevent damage to the fusible plugs or cylinder valves. Always store, transport, and use acetylene cylinders in a vertical position.

KEEP EQUIPMENT AREA WELL VENTILATED

Although acetylene is nontoxic, it is an anesthetic and can cause asphyxiation in a confined area that does not have adequate ventilation. Any atmosphere which does not contain enough oxygen for breathing (at least 19.5%) can cause dizziness, unconsciousness, or death. If adequate ventilation is not provided, acetylene may displace normal air. Acetylene can be detected by its distinctive garlic-like odor. If the odor of acetylene is noticed, immediately attempt to locate the source of the leak and correct it. If a leak in a cylinder or connected apparatus cannot be stopped safely, contact the gas supplier. If possible, the cylinder should be moved to a well ventilated area away form possible ignition sources. Never store, use, or transport acetylene cylinders in confined or unventilated spaces, such as cabinets, closets, tool boxes, and especially in automobile trunks.

ACETYLENE SPECIAL PRECAUTIONS

W A R N I N G

ACETYLENE USED AT PRESSURES GREATER
THAN 15 PSIG IS EXTREMELY UNSTABLE AND
MAY DECOMPOSE VIOLENTLY.

Always use a regulator designed for acetylene use. Never adjust the acetylene regulator to obtain a delivery pressure greater than 15 psig. Never open an acetylene cylinder valve more than one complete turn.

W A R N I N G
NEVER USE CONTAINERS, EQUIPMENT, PIPING
OR REPLACEMENT PARTS OTHER THAN THOSE
SPECIFICALLY DESIGNED FOR USE IN
ACETYLENE SERVICE.

Under certain conditions, acetylene forms readily explosive compounds with copper, silver, and mercury. Contact should be avoided between acetylene and these metals, their salts, compounds, and high concentration alloys.

Acetylene cylinders differ from all other compressed gas cylinders in that they are packed with a porous mass that is saturated with a solvent, usually acetone. During the filling process acetylene gas is dissolved into this solvent to avoid the decomposition characteristics of gaseous acetylene.

Never under any circumstances, attempt to transfer acetylene from one cylinder to another or to mix any gas with acetylene in a cylinder.

OBSERVE ALL APPLICABLE SAFETY CODES WHEN USING ACETYLENE.

Follow the recommendations found in ANSI Standard Z49.1, "Safety in Welding and Cutting", and NFPA Standard No. 51, "Oxygen-Fuel Gas Systems for Welding and Cutting" before installing or using equipment and cylinders in acetylene service.



An automated oxy-acetylene cutting machine.



SPECIALTY GAS AND GAS MIXTURES SAFETY PRECAUTIONS



W A R N I N G

MANY SPECIALTY GASES (INCLUDING
MIXTURES) HAVE FLAMMABLE, TOXIC,
CORROSIVE, OXIDIZING, PYROPHORIC, AND
OTHER HAZARDOUS PROPERTIES. THESE GASES
CAN CAUSE PROPERTY DAMAGE, AS WELL AS
SERIOUS OR FATAL INJURIES IF PROPER SAFETY
PRECAUTIONS ARE NOT FOLLOWED.

INHALATION OF SOME TOXIC SPECIALTY GASES CAN BE FATAL IN VERY LOW CONCENTRATIONS WHILE OTHERS CAN CAUSE SPECIFIC ORGAN DAMAGE AFTER REPEATED EXPOSURE.

In addition, some specialty gases can cause simple asphyxiation by displacing the oxygen in the atmosphere, while corrosive gases can cause serious eye or skin damage upon contact; and flammable gases can present fire and explosion hazards.



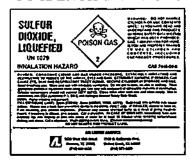
Highly precise reference gas for scientific instrumentation

OBTAIN SAFETY INFORMATION BEFORE HANDLING SPECIALTY GASES

Because of the great number of specialty gases and gas mixtures available, and the variety of hazardous properties of these gases, it is not possible to cover all safety precautions for specialty gases in this pamphlet. If you are not familiar with the handling of specialty gases and their hazardous properties, contact your supplier. Also available are Material Safety Data Sheets (MSDS) presenting the hazardous properties and safe handling procedures for each specialty gas.

READ THE PRECAUTIONARY LABEL ON THE CYLINDER.

READ THE LABEL TO IDENTIFY THE GAS!



This is an important warning applying to all gas cylinders, but it is particularly important for specialty gases because of their unique and varied hazardous properties.

Users of specialty gases are urged to be certain that employees read and follow the precautionary information on all gas cylinder labels. If a cylinder is received with missing, damaged, or illegible precautionary labels, do not use the cylinder, call your gas supplier.

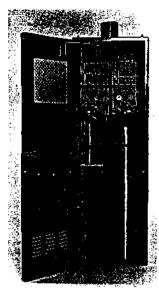
DO NOT PERMIT UNTRAINED PERSONS TO HANDLE SPECIALTY GASES.

Because of the extremely hazardous properties of some specialty gases and their applications, employees must be trained in their safe handling and use.

SPECIAL PRECAUTIONS

When two or more gases, or liquefied gases are mixed, their properties may combine to create additional hazards. Obtain and evaluate the safety information for each component and for the mixture before use.

Special handling and storage precautions must be taken when working with toxic, pyrophoric or corrosive specialty gases. Because of their hazardous nature, many gases may require the use of special personal protective equipment such as respirators, chemical resistant gloves and clothing and nearby eye wash and safety showers.



In many instances Federal, State or local fire codes and regulations may govern or restrict the handling and storage of these gases. One safe usage alternative is the use of a cylinder gas storage cabinet (left). These fully enclosed units will normally hold from one to four cylinders. The cabinets are designed to permit air changes with an exhaust system that will safely carry away any inadvertently released product and many are equipped with leak detection and fire suppression systems. The cabinets can be set up to

be fully automated or operated manually with little or no potential exposure to personnel.

IF NECESSARY TO DISPOSE OF WASTE GAS, EXERCISE EXTREME CAUTION.

No attempt should be made to dispose of any gas mixtures before determining the following:

- 1. What gases are in the mixture?
- 2. At what concentrations are they present?
- 3. What is the total quantity for disposal?
- 4. Is the mixture subject to environmental regulations?

In many cases, sophisticated and expensive scrubbing equipment is necessary to destroy residual gases. It is best to return the unused portion of any gas or gas mixture to your supplier for disposal.

D I S C L A I M E R

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ADDITIONAL INFORMATION



For further technical information about any of these gases or other unlisted gases refer to the "Material Safety Data Sheet" (MSDS), the Air Liquide "Encyclopedie Des Gaz", or to the Air Liquide America video "Hazards of Liquefied and Compressed Gases."



Additional product information about these and other gases can be found in publications and videos produced by the Compressed Gas Association (CGA), 1725 Jefferson Davis Highway, Suite 1004, Arlington, Virginia, ZIP 22202, Tel.: 1 (703) 412-0900.

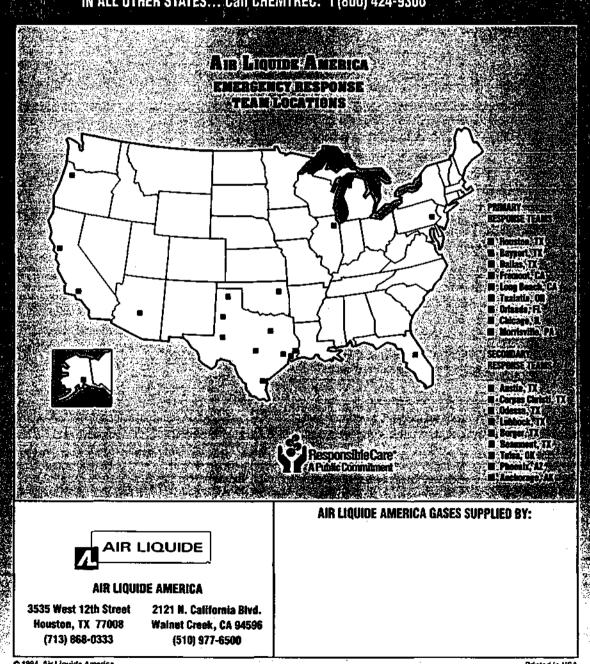
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G-1	"Acetylene"
G-1.1	"Commodity Specification for Acetylene"
G-4	"Oxygen"
G-4.1	"Cleaning Equipment for Oxygen Service"
G-4.3	"Commodity Specification for Oxygen"
G-5	"Hydrogen"
G-5.3	"Commodity Specification for Hydrogen"
G-6	"Carbon Dioxide"
G-6.2	"Commodity Specification for Carbon Dioxide"
Ğ-7	"Compressed Air for Human Respiration"
G-7.1	"Commodity Specification for Air"
G-8.2	"Commodity Specification for Nitrous Oxide"
G-9.1	"Commodity Specification for Helium"
G-10.1	"Commodity Specification for Nitrogen"
G-11.1	"Commodity Specification for Argon"
P-1	"Safe Handling of Compressed Gases in Containers"
P-2	"Characteristics and Safe Handling of Medical Gases"
P-9	"The Inert Gases Argon, Nitrogen and Helium"
P-12	"Safe Handling of Cryogenic Liquids"
P-14	"Accident Prevention in Oxygen-Rich and
	Oxygen-Deficient Atmospheres"
\$B-2	"Oxygen-Deficient Atmospheres"
SB-4	"Handling Acetylene Cylinders in Fire Situations"
SB-8	"Use of Oxy-Fuel Gas Welding and Cutting Apparatus"
SB-14	"Helium Gas for Filling Balloons"
AV-1	"Safe Handling and Storage of Compressed Gases"
AV-4	"Characteristics and Safe Handling of Medical Gases"
AV-5	"Safe Handling of Liquefied Nitrogen and Argon"
AV-6	"Highway Transportation of Gases"
AV-7	"Characteristics and Safe Handling of Carbon Dioxide"
AV-8	"Characteristics and Safe Handling of Cryogenic Liquid
	and Gaseous Oxygen"
AV-9	"Handling Acetylene Cylinders in Fire Situations"

IN THE EVENT OF AN EMERGENCY INVOLVING ANY TYPE OF GAS, CALL THE FOLLOWING EMERGENCY RESPONSE TELEPHONE NUMBER FOR THE AREA IN WHICH THE EMERGENCY HAS OCCURRED.

These Emergency Response telephone numbers also appear on all Air Liquide America shipping papers.

IN TEXAS, OKLAHOMA, and LOUSIANA... Call the Air Liquide America Operations Control Center in Houston, Texas: 1 (800) 364-7378

IN ALL OTHER STATES... Call CHEMTREC: 1 (800) 424-9300



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